[illegible] البحث العلمي

الجامعة التكنولوجية

قسم هندسة البناء والانشاءات

فرع الهندسة الانشائية



مشروع تحليل وتصميم بناية باستخدام برنامج STAAD PRO.V8i ورسم المخططات الانشائية بواسطة برنامج AutoCAD

مشروع التخرج السنوي مقدم الى قسم هندسة البناء والانشاءات
كجزء من متطلبات نيل شهادة البكالوريوس

اعداد الطالب

ياسر وسام عبد الجليل

باشراف

[illegible] عبد الكريم

٢٠١١ م

بسم الله الرحمن الرحيم

((وقال الذين اوتوا العلم ويليكم ثواب الله خير لمن

امن وعمل صالحا ولا يلقاها الا الصابرون))

صدق الله العظيم

شكر وتقدير

أتقدم بشكري و تقديري و امتناني الى استاذي الفاضل

الدكتور علاء كمال عبد الكريم

لما قدمه لي من جهد و توجيه

وارشدني بكل اخلاص لأقدم بحثي هذا

والي اضعه بين يده ثمرة طيبة لجهوده الكريمة

وأتقدم بشكري وتقديري الى كل الاساتذة الذين ساهموا في وصولنا الى هذه المرحلة

مع خالص امتناني الى كل من ساهم في مساعدتي تقديم هذا البحث

والله ولي التوفيق

الإهــــــداء

الى من كان دعاءها دليلي في ظلمتي

الى التي ذرفت الدموع من اجلي

الى ينبوع الحنان و القلب الطيب الوفي

الى نبض قلبي امي......

الى الذين علموني كيف امسك القلم و زهدوا بعملهم لاجلي

الى من ابصرني بدروب الحياة و انار امامي معالم الطريق

الى من وقف الى جانبي ومنحني من علمة و فضلة و توجيهه

الى اساتذتي مع فائق حبي و تقديري.....

الفصل الأول

الفهرست

١-١ انواع الابنية

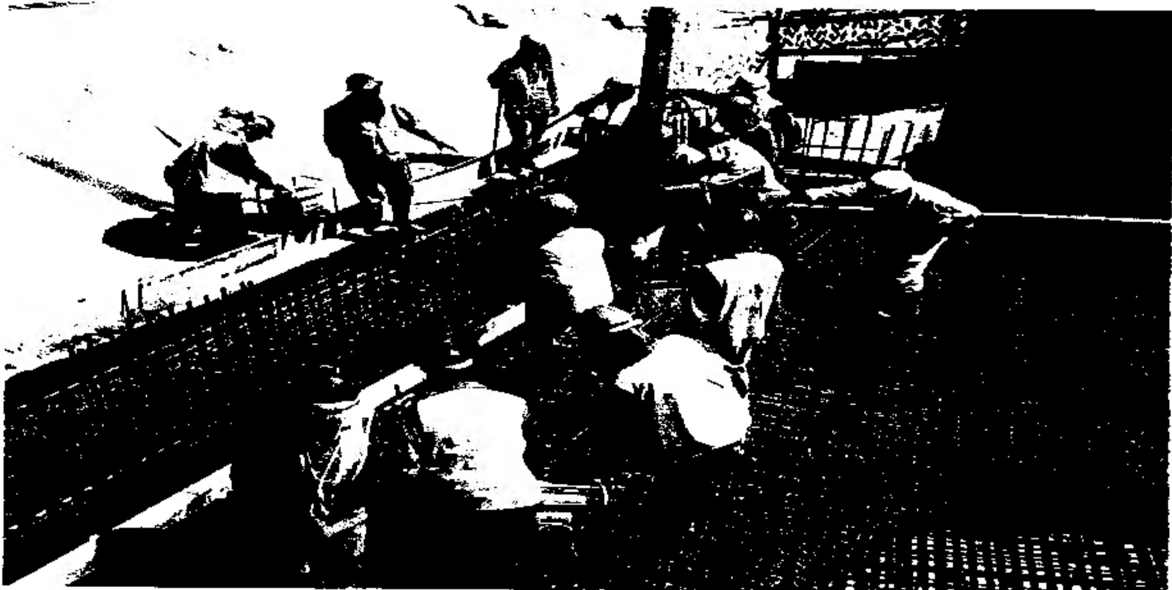
تقسم الابنية الى انواع وفق ما يلي

١-١-١ حسب طريقة التنفيذ

انجاز موقعي

يتم تنفذ كافة فقرات الاعمال تقريبا في موقع العمل ويحتاج هذا الاسلوب في البناء الى ايدي عاملة كثيرة و متعددة الاصناف ، ويستوجب تهيئة و تصنيف المواد بصورة كلية او جزئية.

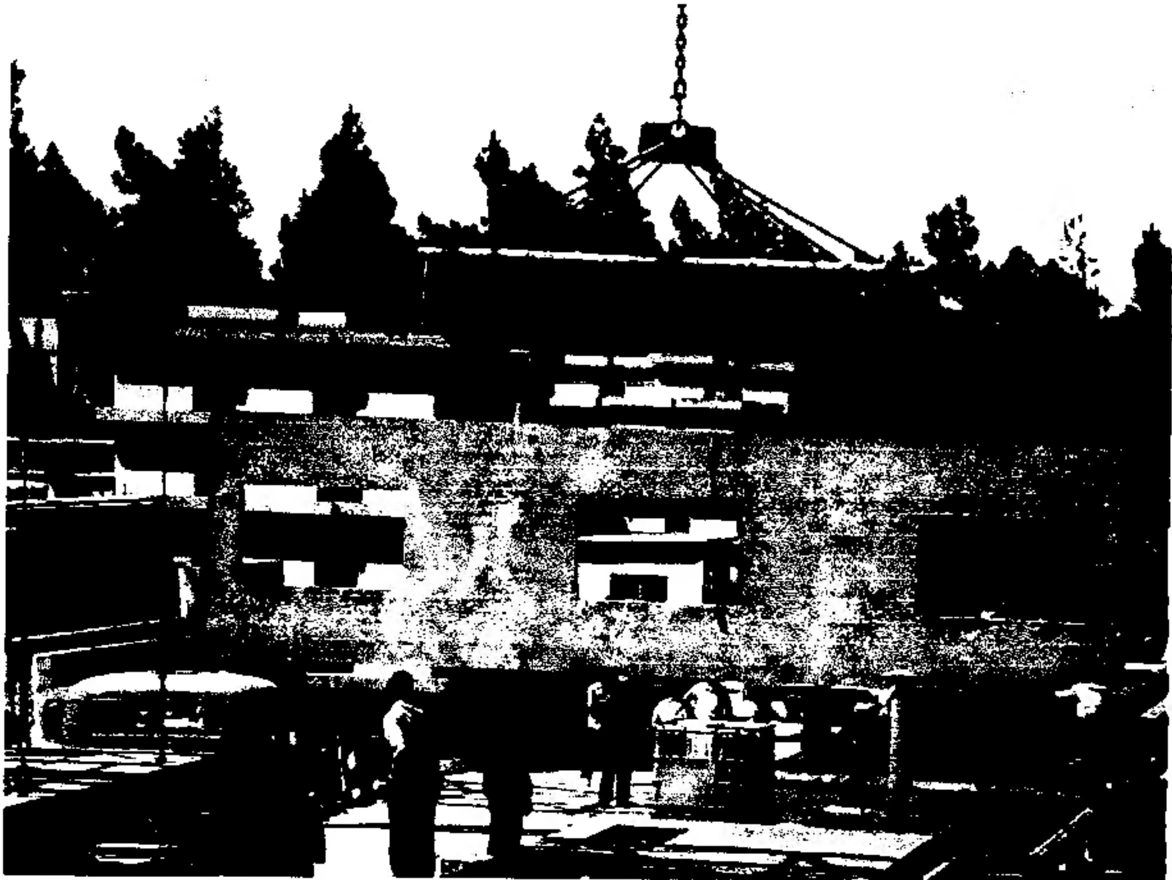
ان مجال تصرف المهندس المصمم في هذا النوع من الابنية واسع الحرية في اختيار الاشكال و المواد المناسبة ، من سلبيات هذا النوع بالتتنفيذ تكون نسبة تلف المواد الاولية عالية وسرعة انجازه بطيئة مقارنة مع بقية انواع التنفيذ.



صب جاهز

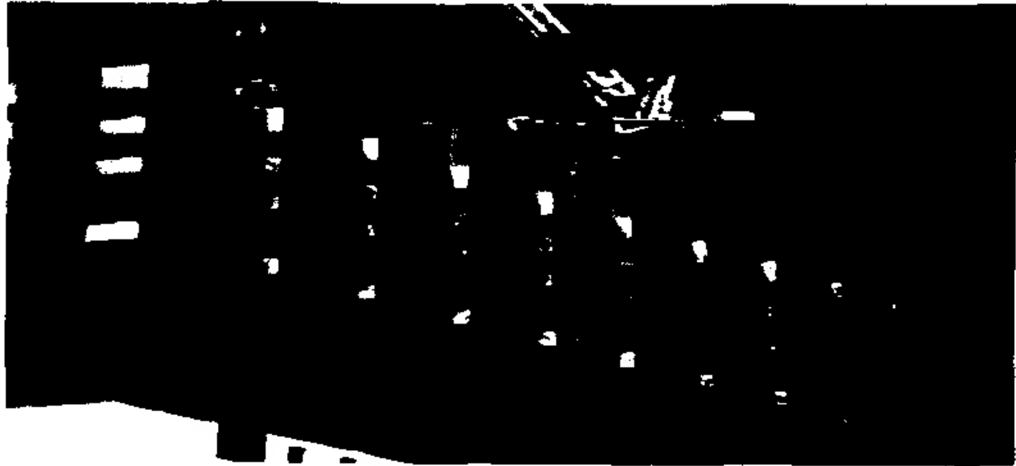
ينفذ هذا النوع باستخدام واحدات انشائية جاهزة مصنوعة في معامل متخصصة تكون خارج الموقع في معظم الحالات وتركب هذة الوحدات في موقع العمل بموجب اساليب وتفاصيل هندسية معينة.

توجد انواع متعددة من البناء الجاهز بنسب مختلفة من التصنيع خارج موقع العمل و تختلف اساليب تصنيع البناء حسب المواد المستعملة فقد يكون البناء خرسانيا ، معدنيا ،بلاستيكيا او مركبا من عدة مواد مختلفة .



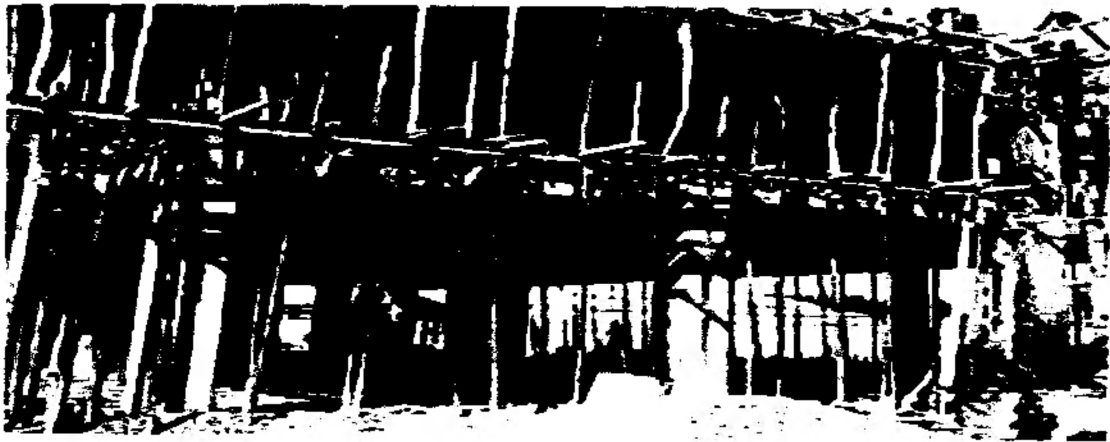
ان المعادن تتحمل اجهادات الشد والربط بدرجة عالية مما يجعل مساحة المقطع المطلوب اصغر مقارنة مع المواد الاخرى و بهذا يقلل من الاحمال النازلة على الاساس ويوفر من المساحات التي تشغلها الاعمدة بفضاء راسي اكبر لهذا فان المنشات المعدنية اصبحت تستخدم في الابنية المتعددة الطوابق و الابنية ذات الفضاءات الواسعة جدا مثل ابنية المصانع والمخازن والمعارض وغيرها و تحتاج الهياكل المعدنية الى وقاية مستمرة من الحريق وكذلك تاثر بالظروف الجوية.

ان وجوب التزام المصمم بالمقاطع القياسية المنتجة والمتوفرة يحد كثيرا من تصرف الهندسي في التصميم وفي الوقت الحاضر تستورد كافة المقاطع المعدنية المستعملة في البناء لذا يكون هذا النوع من البناء ذو كلف عالية.



الهياكل الخرسانية المسلحة تكون اما مصبوبة موقعيا او مسبقة الصب وتتميز الهيكل الخرسانية المسلحة بانة جميع موادها مصنعة محليا ماعدا حديد التسليح . و تعطي الهياكل الخرسانية للمصمم حرية التصرف في انتاج الانماط البنائية و الاشكال المرغوب بها و تتميز بقاومتها للحريق وكذلك بدوامها العالي و بثقل وزنها ويستغرق زمن انشاءها زمنا طويلا بالمقارنة مع الهياكل المعدنية و تحتاج الى سيطرة نوعية في الانتاج والتنفيذ و تكون هذة الهياكل دائمية لا يمكن رفعها او نصبها في مكان اخر.

تنفذ الجدران في الابنية الهيكلية بعد اكمال الهيكل ويمكن رفع الجدران من دون تاثير على سلامة المنشا .



• البناء غير هيكلي

تنقل احمال الارضيات في هذا النوع من البناءالى الاسس بواسطة جدران حاملة للاثقال لايمكن رفعها بعد البناء بخلاف البناء الهيكلي و يتبع هاذا الاسلوب في الابنية الاعتيادية ذات الطوابق القليلة لانة تعدد الطوابق يعني زيادة سمك الجدران الامر الذي يؤدي الى نقصان المساحات الصافية للطوابق وتسليط احمال كبيرة على الاساس ويجب ان تبنى الجدران الحاملة قبل بناء السقوف و الارضيات.

• البناء المشترك

في هذا النوع هناك اعمدة واعتاب خرسانية او معدنية تعمل كهيكل في جزء من البناء وايضا جدران حاملة في بعض الاجزاء الاخرى ويتبع هذا الاسلوب لتنفيذ متطلبات معمارية و انشائية لاسباب اقتصادية ايضا ومن الضروري توفير التفاصيل الانشائية و اعداد التصاميم بشكل ملائم لتجنب الهبوط التفاضلي للاسس اكثر من الحد المسموح بة .

١-٢ عناصر البناء الهيكلي

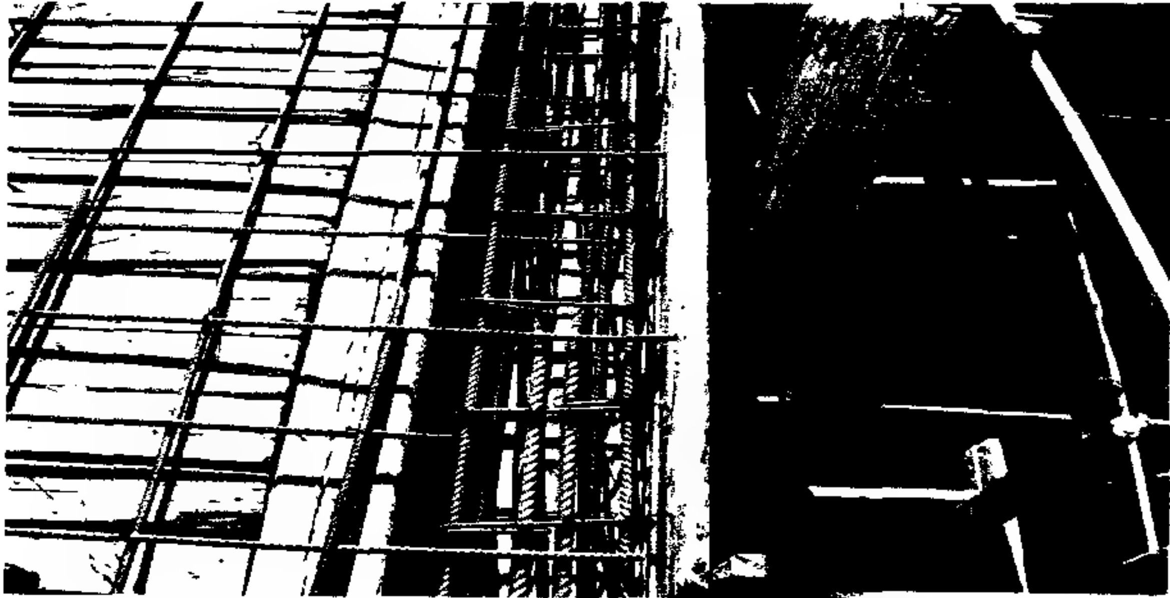
يتكون البناء الهيكلي الخرساني من ثلاثة عناصر رئيسية والتي يتكون من مجموعها الهيكل العام للابنية المختلفة سواء كانت صناعية ،سكنية ،تعليمية ام صحية ذات طابق واحد او متعددة الطوابق مع استعمال المواد المختلفة في انشائها كالحديد والخشب والخرسانة المسلحة وسنقتصر على بيان عمل وتفاصيل البناء باستعمال الخرسانة المسلحة المصبوبة موقعيا.

ان النظام الهيكلي في الانشاء يتميز بميزات كثيرة لاتتوفر في غيرة من الانظمة البنائية الاخرى كنظام الجدران المحملة للاثقال مثلا حيث يعطي مرونة كبيرة في تقسيم الفضاءات الداخلية وحسبما تتطلبة التصاميم المعدة لها كما ان بالامكان تغير حجوم هذة الفضاءات لمرات كثيرة اذا تطلب الامر اعادة تصميم القواطع الداخلية لانها عناصر غير انشائية بل اجزاء لقسيم الفضاءات الداخلية ولا تتحمل اي نوع من الاثقال سوى ثقل نفسها فقط اما الاثقال الانشائية فيتحملها الهيكل العام للابنية باختلاف انواعها من اثقال ثابتة او متحركة.



ان هذة المرونة لا تتوفر في غيرة من الانظمة الانشائية الاخرى كالبناء باستعمال الجدران الحاملة للاثقال كنظام انشائي في تشييد الابنية حيث لا يمكن رفع اوتغيير

ان ارتفاع الروفد يجب ان لا يقل عن النسبة (٢٠/١) من المسافة الفاصل بين الاعمدة و في حالة عداد التصاميم الاولية لاي مشروع من قبل المهندس فان ارتفاعها يقدر بنسبة (١٠/١) من مسافة الفضاء الفاصل بين الاعمدة كتقدير اولي لها في حين يتراوح سمك هذة الروافد من (١/١-٣) من ارتفاعها وبصورة عامة فان هذة النسب هي تقديرات اولية لارتفاع و سمك الروافد الخرسانية ولكنها يجب ان يتم تصميمها حسب الاثقال المسلطة عليها.



ان هنالك انواع مختلفة من الروافد المصبوبة موقعيا منها الروافد الاعتيادية والتي يكون موقعها اسفل الصبة الخرسانية للسقف اما النوع الثاني هي الروافد الراسية وهي التي يكون موقعها اعلى الصبة الخرسانية للسقف و تسستعمل في الفضاءات الكبيرة ذات الطابق الواحد ذلك لعدم امكانية استعمال السقف كارضيات للطوابق العليا لوجود هذة الروافد ام النوع الاخر فهي الروابط المخفية وهي التي يتم تصميمها لتكون جزء من الصبة الخرسانية للسقف .

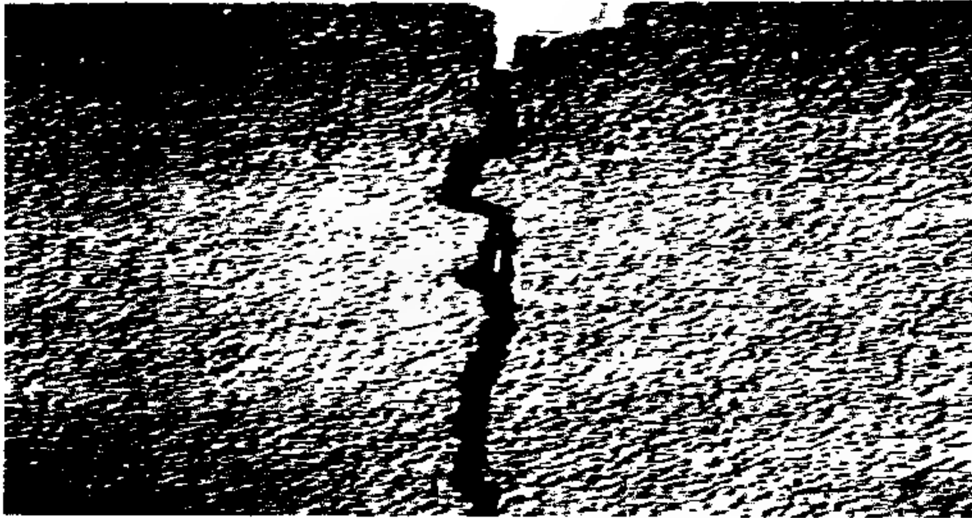
•الارضيات و السقوف Floors &Roof slabs

هي الاجزاء الافقية بالنسبة للابنية المختلفة حيث تجلس هذة الاجزاء فوق الروافد التي تربط الاعمدة مع بعضها لتقسم الابنية بواسطتها الى طوابق متعددة حيث يتم عملها من الخرسانة المسلحة و التي يكون تسليحها باتجاة واحد عندما تكون الصبة الخرانية تستند على الروافد من الجانبين او تكون مسلحة باتجاهين متعاكسين عندما تكون من الصبة الخرسانية مستندة على الروافد الاربعة التي تحيط بالفضاء.

ان هذة الارضيات و السقوف تقوم بنقل و تحميل جميع الاثقال و القوى المسلطة عليها و المتكونة من الاثقال الناتجة من وزن الارضيات والسقوف نفسها والاثقال الثابتة من مواد الانهاء و الاثاث الثابت ليتم نقلها الى الروافد و منها الى الاعمدة التي تقوم بنقلها الى الاساس ومنها الى التربة.



تجعلها تتحمل كل العيوب التي بها دون أن تشكل خطراً كبيراً على ساكنيها إلا في حالات الهزات الأرضية والكوارث الطبيعية.



المباني غير الخرسانية

يندر وجود مبان متوسطة العمر أو حديثة العمر غير خرسانية في المشرق العربي ، بينما قد تتوفر في المغرب العربي مبان حديثة ومتوسطة العمر تعتمد على جدران حاملة من الحجارة أما الأساسات والأسقف فهي من الخرسانة المسلحة ، كذلك قد يوجد في النادر بعض المباني التي تقام على جدران حاملة من الطوب بأنواعه المختلفة وبقية الهيكل من الخرسانة المسلحة .

أما النوع الأخر من المباني الحديثة غير الخرسانية فهو البناء من الفولاذ الصلب وقد نجد عدداً لابأس به من هذه المباني في بعض عواصم الدول العربية والمدن الهامة بها وسوف لن نتطرق إليه المباني الخرسانية.

معظم المباني الخرسانية في العالم العربي الصغيرة منها والكبيرة لها النظام الانشائي نفسه وهو عبارة عن هيكل من الأعمدة والحواجز والبلاطات التي تستند في الغالب على رقاب للأعمدة وجسور أرضية تنتهي إلى الأساسات المنفردة أو المستمرة أو

الحصائر وتستخدم الأوتاد في بعض الأبنية التي تتطلب تربتها مثل هذا النوع من الأساسات أنواع التصدعات وأسبابها في العالم العربي يفتقر العالم العربي على المستوى القطري والإقليمي والعربي على السواء إلى قاعدة للبيانات في المجالات المختلفة تحتوي على التجارب والأبحاث والخبرات التي توفر للباحث المعلومات الضرورية التي يحتاجها في هذا البحث أو ذاك وتساعد على التنسيق وتفادي الإزدواجية.

لذلك فمن الصعب جداً على المرء أن يعمم تجارب مدينة أو منطقة على قطر ويصعب كذلك تعميم تجارب بلد على عدة بلدان وستبقى هذه المشكلة حتى توجد مثل هذه القاعدة العامة للمعلومات التي يمكن الاستعانة بها على المستوى القطري والإقليمي والعربي ولم يكن لي من حيلة في الوصول إلى بعض التعميم حول موضوع التصدعات وأسبابها في العالم العربي إلا من خلال الاستعانة بمجلد البحوث الخاص بندوة تصدعات المباني في العالم العربي.



Figure 15. RC frame building with masonry infills in Algeria (after the 2003 Boumerdes earthquake). (a) masonry infill walls fail in both directions; (b) Masonry infill wall failure showing diagonal cracking due to compression strut action (photos: S. Brzev)

تصدعات المباني في العالم العربي

تأتي في المرتبة الأولى سوء التنفيذ يلي ذلك التصدعات التي تحدث بفعل العوامل الجوية والظروف البيئية المحيطة مثل تصدعات الإنكماش والحرارة والتشققات الذاتية والتي تحدث في الخرسانة في عمرعا الأول وهي الأخرى تعد تنفيذية في غالبها ، ومن هذا يمكن القول أن أكثر من٥٠ % من التشققات تحدث بسبب سوء التنفيذ و النقاط التالية تبين بعض أسبابها

أسباب تتعلق بسوء التنفيذ

١- استعمال مواد أولية رديئة ولا تطابق المواصفات واستعمال خرسانة فقيرة وضعيفة ومقاومتها أقل بكثير من المطلوب في مواصفات المشروع.

٢- تقليل كمية التسليح وتقليل عرض القطاعات وسمكها.

٣- عدم مراعاة الظروف المناخية والبيئية المؤثرة وعدم أخذ الاحتياطات لفروق درجات الحرارة بين الخرسانة والجو الخارجي وخاصةً عند صب كميات ضخمة من الخرسانة.

٤- إهمال الدعم الجيد للشدات وعدم مراعاة أصول الصناعة والمواصفات في كيفية تثبيتها وخاصةً عند إنشاء الأذرعة ، وفي بعض الحالات إزالة الشدات قبل حصول الخرسانة على المقاومة المطلوبة.

٥- إضافة أحمال جديدة فوق البلاطات أو الجسور أو الأعمدة دون مراعاة لما تتطلبه من حلول إنشائية صحيحة.

٦- إهمال التصريف الصحيح لمياه الأمطار وسوء تنفيذ الميول والصرف الصحي وعدم العزل الجيد للأنابيب.

٧- إهمال أنظمة ضبط الجودة ومراقبتها في المصنع والموقع.

٨- عدم اختيار جهاز الإشراف الجيد والمقاول الكفء القادرين على استدراك الأخطاء وحل مشكلات التنفيذ.

٩- سوء اختيار أماكن الفواصل وتنفيذ بعضها وإهمال الآخر.

١٠- زيادة تحميل الأعضاء الخرسانية في عمرها الأول عما تتحمله مقاومتها كتخزين مواد الإنشاء ومعدات التشييد.

١١- قطع قضبان التسليح وإيجاد فتحات في الخرسانة لم تؤخذ في التصميم الإنشائي.

١٢- فقدان الاهتمام والعناية بنقل ورفع وتركيب وتثبيت الوحدات مسبقة الصنع.

وفي المرتبة الثانية تأتي التصدعات التي تنشأ بسبب مشكلة في ميكانيكا التربة وهندسة الأساسات وكثير منها يتعلق بارتفاع المياه الجوفية ، وتبين النقاط التالية بعض الأسباب التي تؤدي إلى تصدعات في مجال ميكانيكا التربة وهندسة الأساسات.

أسباب تتعلق بميكانيكا التربة وهندسة الأساسات

١- تربة انتفاخية

٢- تربة انهيارية

٣- دراسات ناقصة وغير متكاملة عن أحوال التربة أو تخمين خاطئ لتحملها ، وإهمال تقارير خبراء التربة

٤- عدم تجانس التربة في المواقع

٥- هبوط التربة مع الزمن

٦- هبوط التربة تحت تأثير التأسيس لمباني مجاورة

٧- ارتفاع منسوب المياه الجوفية أو تأثير الأمطار والمجاري والزراعة والتسربات

٨- ردميات غير مناسبة

٩- تغير خواص التربة بتغير نسبة الرطوبة وارتفاع المياه الجوفية

١٠- زيادة الأحمال على الأساسات
١١- نسبة أملاح أو كلوريدات وكبريتات عالية
١٢- إهمال عزل القواعد والمنشآت التحتية بالشكل المناسب

أما النوع الذي يأتي في المرتبة الثالثة فهو صدأ التسليح والذي يتركز عادةً في المدن الساحلية والقريبة من البحار والأنهار ، ويبين الجدول التالي أهم الأسباب المؤدية إلى صدإ التسليح ومنه نرى أن جزءاً مهماً منها يرجع إلى سوء التنفيذ أو قصور التصميم فيما يخص الخرسانة والغطاء الخرساني.

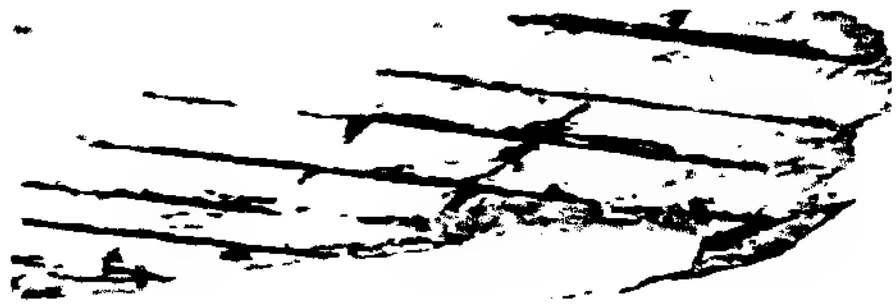
أسباب تتعلق بصدأ حديد التسليح

١- توفر الكلور بكميات كبيرة قريباً من الأسطح الخرسانية.
٢- إهمال استعمال العوازل المختلفة التي تمنع أو تحد من تسرب الكلوريدات والرطوبة والهواء إلى داخل الخرسانة.
٣- زيادة نسبة الكلوريدات في الهواء أو الوسط من حول الخرسانة.
٤- تخزين المواد الكيميائية التي تعمل على صدأ التسليح.
٥- إهمال وقصور في تصميم وتنفيذ الغطاء الخرساني المطلوب
٦- ضعف الخرسانة
٧- زيادة نسبة الماء/الاسمنت.
٨- إهمال احتياطات الجو الحار والظروف البيئية الأخرى وأثر الحرارة على تعجيل التفاعلات الكهروكيميائية.
٩- رشوحات وتسربات التمديدات الصحية وغيرها
١٠- مياه الأمطار والمياه الجوفية ومياه الري والزراعة وغيرها
١١- المد والجزر
١٢- احتواء الحصويات وماء الخلطة على نسبة عالية من الكلوريدات
١٣- انخفاض نسبة الاسمنت عن الحد الأدنى لها.

١٤- تطبيق المواصفات الأجنبية دون النظر إلى الظروف البيئية المختلفة

١٥- إهمال ضبط الجودة ومراقبتها بالنسبة للخرسانة وموادها.

١٦- ترك العناية بالمعالجة للأسطح الخرسانية المختلفة مما يساعد على وجود الانكماش والتشققات الحرارية التي تساعد على تسرب الأملاح والرطوبة والهواء إلى داخل الخرسانة.



وفي المرتبتين الأخيرتين قصور التصميم والكوارث الطبيعية ، وتبين النقاط التالية بعض الأخطاء في التصميم التي تؤدي إلى تصدعات في المباني.

أسباب تتعلق بأخطاء التصميم

١- عدم شمول المخططات والمواصفات للتفاصيل الضرورية واللازمة لحسن التنفيذ

٢- الاعتماد على مواصفات عالمية أو أجنبية قد لا تتناسب مع ظروف البلد وكفاءة العمال وطريقة التنفيذ

٣- اختيار مخططات نموذجية للعمائر أو للبيوت السكنية وتنفيذها في مناطق مختلفة دون مراعاة ظروف كل موقع

٤- اختيار مواد غير مناسبة أو صعبة التنفيذ مع توفر المواد التي تعطي إمكانات أكبر وكذلك استخدام المواد في غير موضعها كاستخدام التسليح عالي المقاومة مع خرسانة ضعيفة جداً

٥- إغفال حساب بعض القوى الأفقية التي تنشأ من أشكال المباني

٦- إهمال توفير التسليح اللازم لمقاومة الانكماش والإجهادات الحرارية

٧- عدم تصميم الغطاء الخرساني بما يتناسب وظروف المنشأ والبيئة المحيطة

٨- عدم اختيار الاستشاري أو المهندس الكفء للقيام بعملية التصميم

٩- النقص في مقاسات العناصر الإنشائية وتسليحها لمقاومة الأحمال والعزوم والقص .

لاستكمال الموضوع من جوانبه كافةً نورد النقاط التالية الذي يبين بعض أسباب التصدعات التي ترجع إلى سوء الاستعمال وإهمال الصيانة.

أسباب تتعلق بسوء استعمال المباني

١- زيادة الطوابق في المباني أو دور السكن القديمة

٢- تغطية الفرق في اختلاف المناسيب بكميات من الرمل لها أوزان كبيرة

٣- زيادة الأحمال نتيجة لأعمال الترميم كزيادة سمك البلاطة والطبقة العازلة لتفادي تسرب المياه والتخزين السيء لمواد الترميم فوق المبنى

٤- تغيير الغرض الذي أنشأ من أجله المبنى مثل أن يتحول مبنى سكني إلى مدرسة

٥- فقدان الصيانة الدورية والوقائية والعلاجية

٦- الصيانة والإصلاحات الخاطئة

٧-الصيانة المتأخرة بعد فوات الأوان واستفحال الأضرار

الفصل الثاني

- الاحمال الميتة (dead load)
- الاحمال الحية (live load)

٧- يقوم البرنامج بتحليل اجزاء وعناصر المنشا حسب طريقة التحليل الانشائي المستخدم

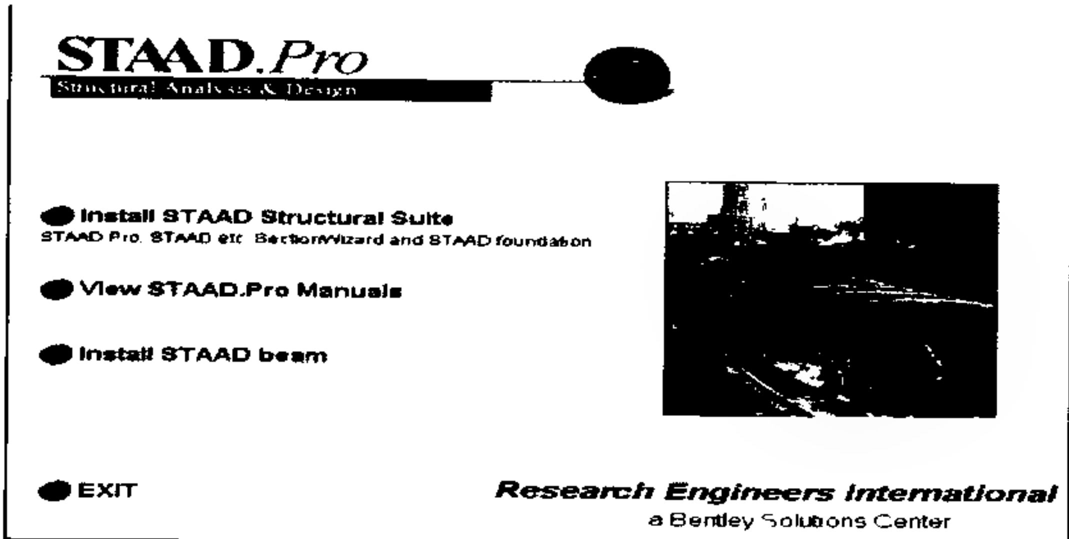
٨- يتم التصميم بالاعتماد على مواصفة عالمية معينة والتي جهز بها البرنامج مثل ACI CODE.

مميزات Staad pro.

١- يحتوي البرنامج على عدد من نماذج المنشاءات الجاهزة بقالبها العام مع امكانية تعديل كافة المتغيرات للحصول على النموذج باقل جهد ممكن.

٢- يتضمن البرنامج طرق فعالة و ادوات متنوعة لتمثيل المنشا ت المعقدة بطريقة ثلاثية الابعاد من خلال واجهة البنائية.

٣- يتميز البرنامج بامكانيتة القوية في عرض النتائج عدديا وبيانيا كما يتضمن البرنامج برنامجا جزئيا في لعرض التقارير و يتميز البرنامج بامكانيات متقدمة لانشاء التقارير مخصصة و احترافية للمشروع .

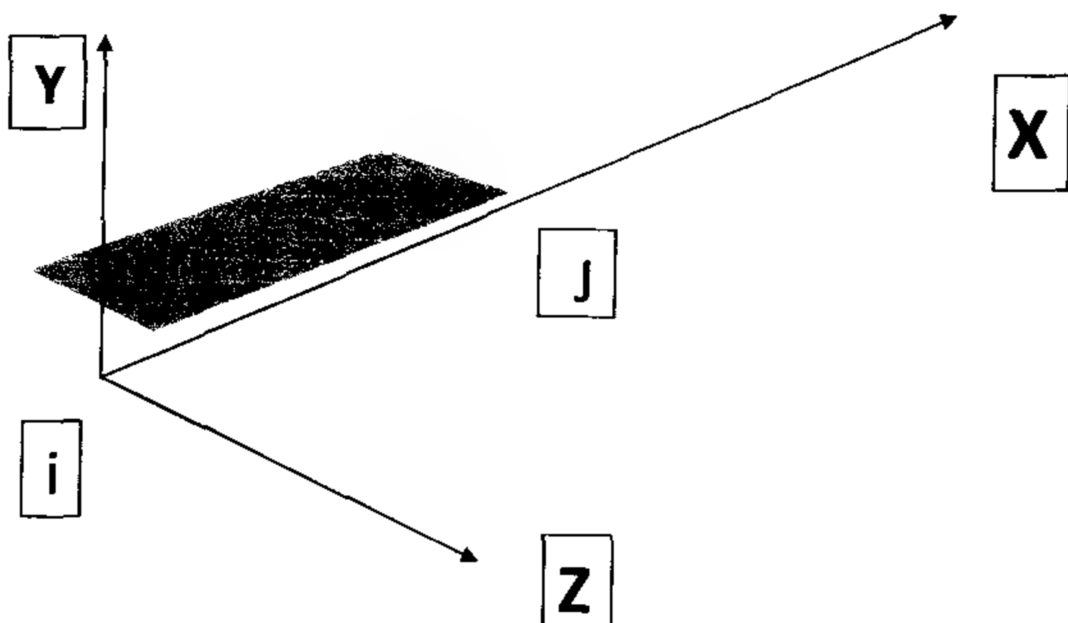


يستخدم STAAD.PRO نموذجين من جمل الاحداثيات لتعريف الشكل الهندسي للمنشا وهما

ا-جملة الاحداثيات المحلية local Coordinate System

يقترن مع كل عنصر من عناصر المنشا جملة من الاحداثيات ديكارتية مستطيلة موضعية او محلية تحقق محاور احداثيات كل جملة محلية قاعدة اليد اليمنى .يظهر الشكل ادناة عنصر جاسى بوصلة بداية (i) و وصلة نهائية (j) ويقترن مع هذا العنصر جملة احداثيات موضعية معرفة بالنسبة الى جملة الاحداثيات الديكارتية وتصف بشكل كاف توضع هذا العنصر بالنسبة للجملة العام .

يحدد الاتجاة المحلي للمحور(X) من الوصلة (i) الى الوصلة (j) ويمكن تطبيق قاعدة اليمنى للحصول على الاتجاة الموجب لكل من المحورين (Y ,Z)



أ-جملة الاحداثيات العامة Global Coordinate System

يتعامل البرنامج مع ثلاثة نماذج من جمل الاحداثيات العامة لتوصيف الشكل الهندسي للمنشا وهي

• جملة الاحداثيات الديكارتية التقليدية conventional Cartesian coordinate system

وتتالف جملة الاحداثيات الديكارتية المستطية من نقطة مبدا (o) و ثلاث محاور متعامدة OZ-OY-OX تحقق قاعدة اليد اليمنى ويمكن استخدام هذه الجملة لتعريف نقاط الوصل واتجاهات القوى المطبقة ويرمز للانتقالات وق المحاور الثلاثية بالرمز u1-u2-u3 ويرمز للدورنات بالرمز u4-u5-u6 وفق المحاور OZ-OY-OX على الترتيب.

• جملة الاحداثيات الاسطوانية Cylindrical Coordinate system

ننشى هذه الجملة باستبدال المحورين OY-OX في الجملة الديكارتية التقليدية بنصف القطر و الزاوية مقاسة بالدرجات ام المحور OZ مطابقا للمحور OZ في الجملة الديكارتية ويتم تحديد اتجاهه الموجب وفق قاعدة اليد اليمنى.

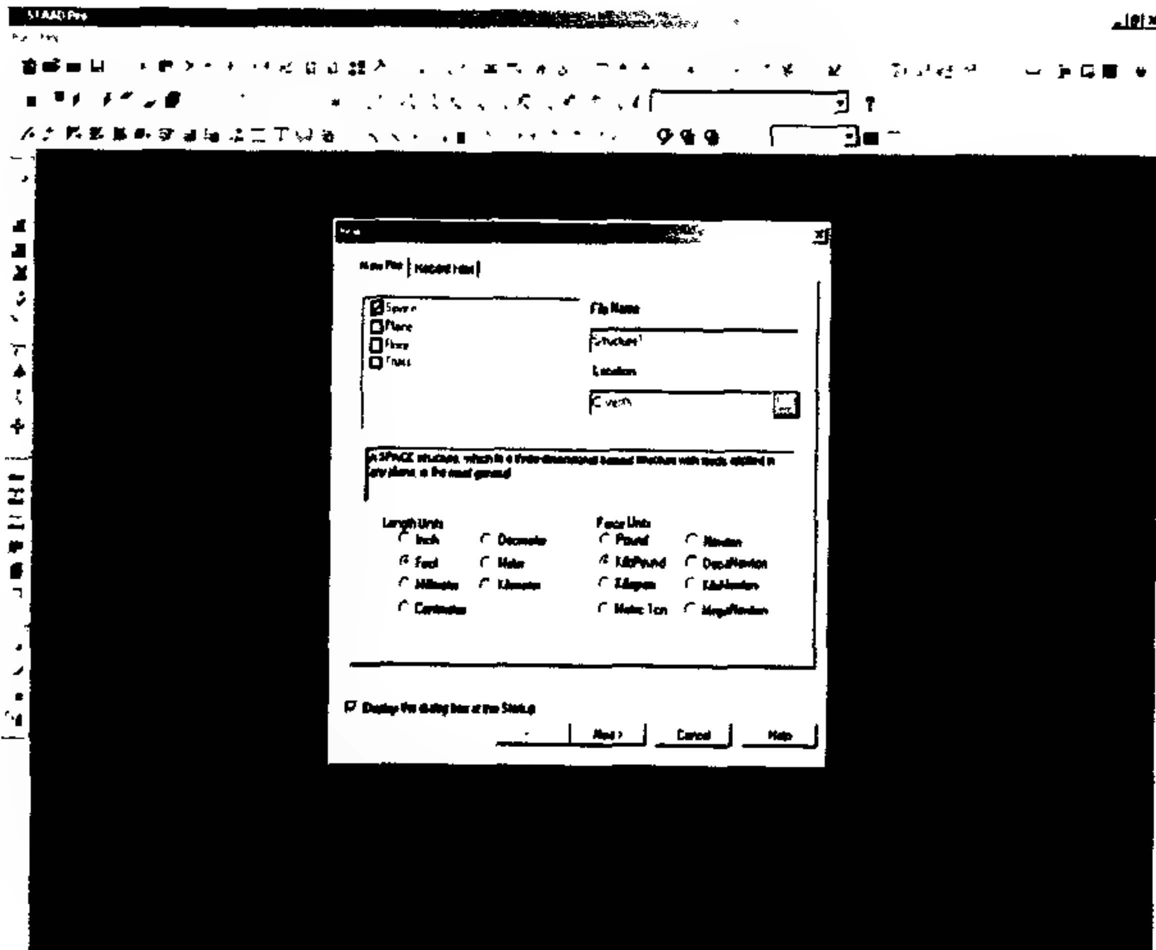
• جملة الاحداثيات الاسطوانية المعكوسة Reverse Cylindrical coordinate system

وهي نموذج من الاحداثيات الاسطوانية بحيث يقترن المستوي (r-θ) في هذة الجملة مع المستوي (x-z) من جملة الاحداثيات الديكارتية التقليدية وتنطبق قاعدة اليمنى لتعريف الاتجاة الموجب للمحور(y) .

نماذج المنشات التي يعالجها البرنامج

يتالف المنشا من مجموعة من العناصر الانشائية تماسك مع بعضها البعض لتؤلف منشا يقاوم الحمولات التي يتعرض لها والمنشاءات هي

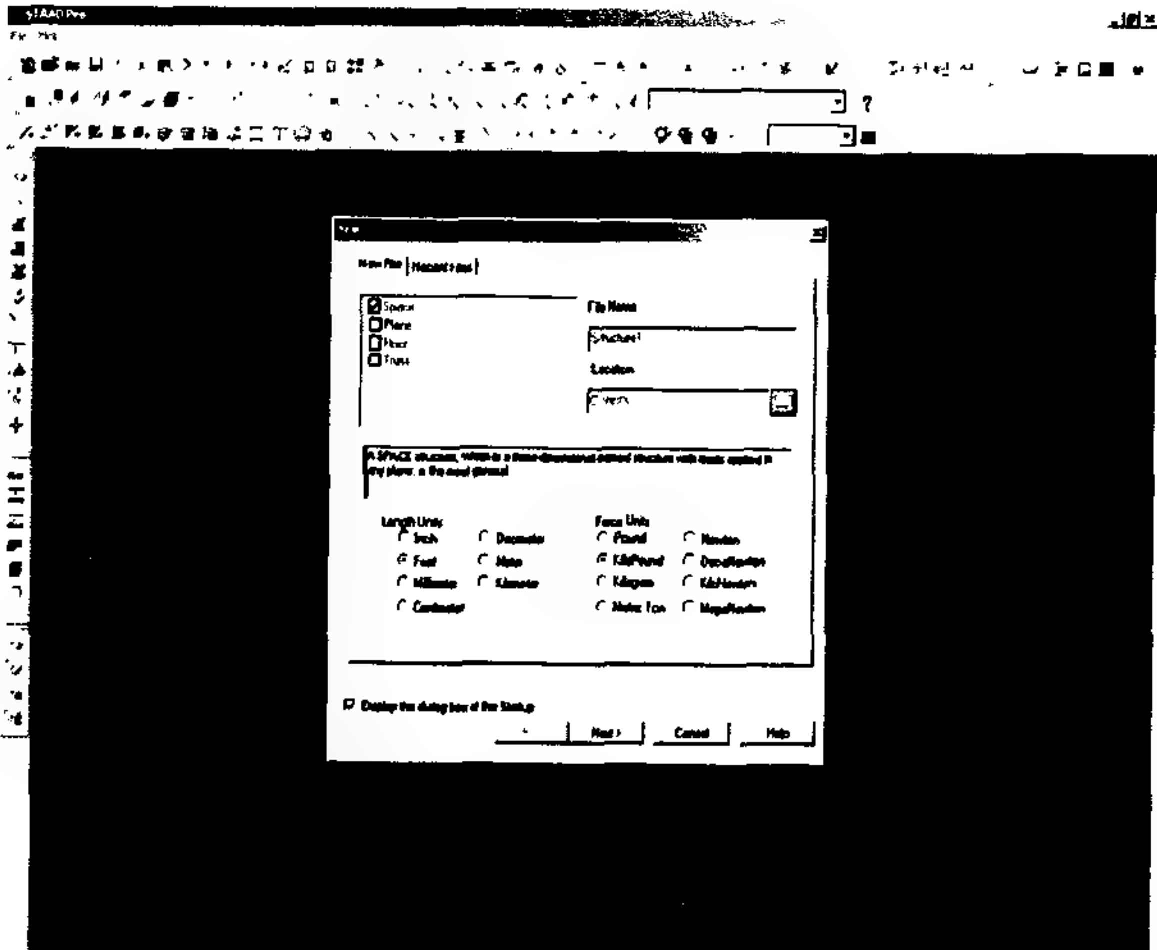
- المنشات الثلاثية الابعاد Space structure
- المنشات المستوية plain structure
- المنشات الشبكية Truss structure
- منشات الارضيات Floor structure



نماذج المنشآت التي يعالجها البرنامج

يتالف المنشا من مجموعة من العناصر الانشائية تماسك مع بعضها البعض لتؤلف منشا يقاوم الحمولات التي يتعرض لها والمنشاءات هي

- المنشات الثلاثية الابعاد Space structure
- المنشات المستوية plain structure
- المنشات الشبكية Truss structure
- منشات الارضيات Floor structure



٢-٢مصفوفة الصلابة

يعرف المنشا في طريقة مصفوفة الصلابة بانة مجموعة من اجزاء مرتبطة ببعضها في مفاصل تدعى العقد (node) . ان الاحمال الخارجية تكافى باحمال تكون مسلطة في العقد . ان اعادة ارتباط اجزاء المنشا في مواقع عقدة تستند على الشروط التالية .

- توازن القوى
- توافق الازاحات
- علاقة القوة بالازاحة

علية فان طريقة مصفوفة الصلابة تعتمد على تجزئة المنشا الى اجزاء ترتبط ببعضها بعدد محدد من المفاصل التي ندعى العقد . ان الحالة المثلى لتمثيل المنشا تعتمد على عدد الاجزاء المفروضة و شكلها و ابعادها على ان يكون المنشا الاصلي ممثلا بالحالة المجزاة التي يجب ان يبقى فيها النموذج الازاحي قريب من الحل الصحيح. ويفترض ان جزء المنشا مستقيم ومنتظم المقطع، وان خواص مادتة ثابتة ، وان يرتبط بالاجاء القريبة منة بواسطة العقد .و نتيجة لذلك فان مواقع العقد يجب ان تكون التي يحصنل فيها تغير في الشكل الهندسي او تغير في الاحمال المسلطة او تغير في خواص المادة .

ان العلاقة الاساسية التي تربط الاحمال (F) والازاحات (Δ)في النهايات الحرة والصلابة (K) يمكن كتابتها بالشكل التالي

$$F=K*\Delta$$

حيث ان

F :تمثل مصفوفة الاحمال المسلطة على العقد

K :تمثل مصفوفة الصلابة للمنشا

Δ: تمثل الازاحات في العقد

تشكيل مصفوفة الصلابة الكلية للمنشا

ان ذلك يعني وضع مصفوفات الصلابة لاجزاء المنشا الواحد بمصفوفة صلابة واحدة تدعى مصفوفة صلابة المنشا ويعتمد ذلك على الايفاء بالشرطين التاليين :-

١. شرط توازن القوى

ان اي جزء من المنشا يجب ان يكون في حالة توازن تحت تاثير القوى المؤثرة علية ، و بالتالي يجب ان يكون المنشا الكلي في حالة توازن . ان عدد حالات التوازن يعتمد على يعتمد على طبيعة الاجزاء المفروضة في المنشا و عددها . ومن الملائم وضع حالات التوازن بدلالة القوى المؤثرة على العقد او مفاصل للمنشا .اي ان مجموع القوى المؤثرة في الجزء تساوي صفر .

٢. شرط توافق الازاحات

اذا فرضنا اي عقدة في المنشا ببعدين لها انحراف في كل من الاحداثيين (x) و(y) و دوران حول الاحداثي (Z) فان ذلك يعني ان هنالك ثلاث ازاحات في العقدة وان هذة الازاحات يجب ان تتوافق مع الازاحات في نهاية اي جزء من الاجزاء المربوطة بالعقدة وفي نقطة الربط.

فاذا كانت (n) دالة على عدد العقد في المنشا و (m) دالة على عدد درجات الحرية في العقدة الواحدة فان المجموع الكلي لمعادلات التوافق يساوي (m*n) .

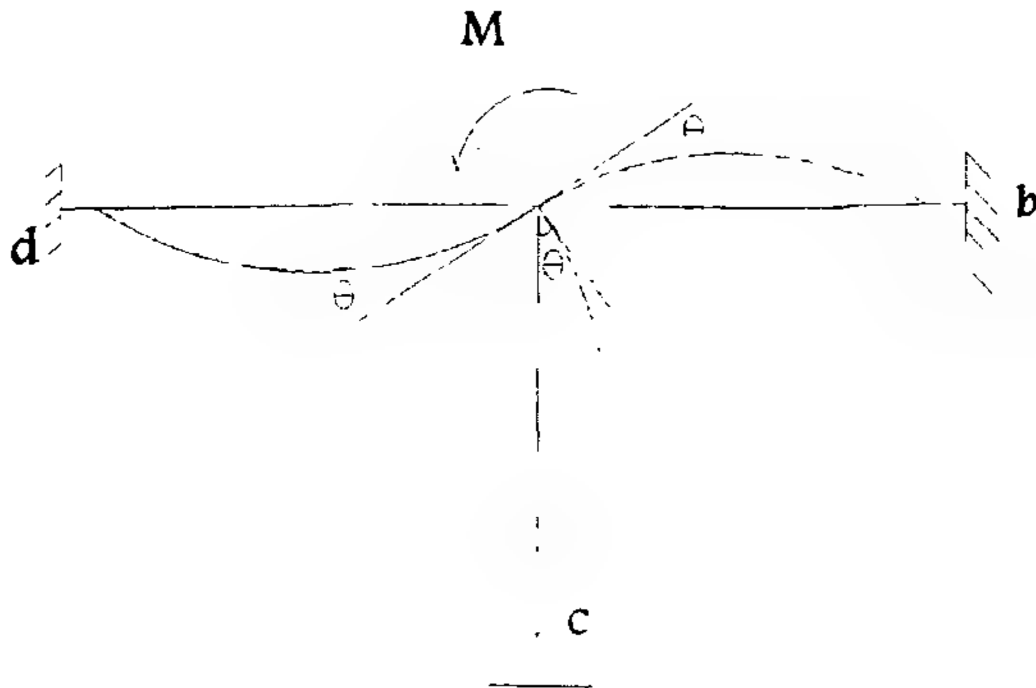
والايفاء بالشرطين المذكورين في اعلاة يمكن وضع مصفوفة صلابة اي جزء من اجزاء المنشا في موقعها الصحيح في مصفوفة صلابة المنشا

درجات حرية الحركة

ذكرنا ان اول خطوة في طريقة مصفوفة الصلابة هي تجزئة المنشا الى مجموعة من الاجزاء المربوطة مع بعضها بواسطة العقد ويمكن تحديد مواقع العقد في منشاء كما يلي :-

١) مواقع المساند
٢) نهايات الاجزاء
٣) المفاصل في الهياكل والجملونات
٤) المواقع التي يتغير فيها المقطع
٥) نقاط الاحمال المركزة

بما ان اي منشا خطي مستمر يكون محتويا على عدد غير محدود من الازاحات . لكن يمكن توضيح الشكل المزاح بعدد محدود من الازاحات . ان هذا العدد المحدود المعرف للشكل المزاح يدعى "عدد درجات حرية الحركة "فمثلا يمكن القول بان الهيكل الموضح بالشكل ادناة لة درجة واحدة منحرفة الحركة ممثلة بدوران المفصل (a) بمقدار (θ) وبمعرفة دوران المفصل يمكن احتساب كل القوى الداخلية و معرفة الخط المرن الشكل المزاح اذا اهمل تغير الشكل محوريا ان عدد درجات حرية الحركة لمنشا يساوي عدد مركبات الازاحة في العقد و بايجاد قيم هذة الازاحات فان ذلك يعني معرفة الشكل المزاح للمنشا ولذلك ان الاجزاء بين العقد تعتبر منحنيا مرنا معتمدة على ازاحات نهاياتها و الاحمال المسلطة وخواصها الهندسية.



لمعرفة دوران المفصل يمكن احتساب كل القوى الداخلية ومعرفة الخط المرن للشكل المزاح اذا اهمل تغير الشكل محوريا ان عدد درجات حرية الحركة لمنشا يساوي عدد مركبات الازاحات في العقد و بايجاد قيم هذة الازاحات فان ذلك يعني معرفة الشكل المزاح للمنشا.

للمنشاءات ذوات الابعاد الثلاثة يفرض ان لها ست درجات لحرية الحركة في كل عقدة اما اذا كان المنشا ذا بعدين فيفرض ان لة ثلاث درجات لحرية الحركة في كل عقدة و ان بعض من هذة الدرجات يمكن ان تكون مقيدا بسبب مساند المنشا اوبسبب فرض سلوكية معينة للمنشا . وعلية فان الدرجات الباقية تكون ممثلة لعدد درجات حرية الحركة .

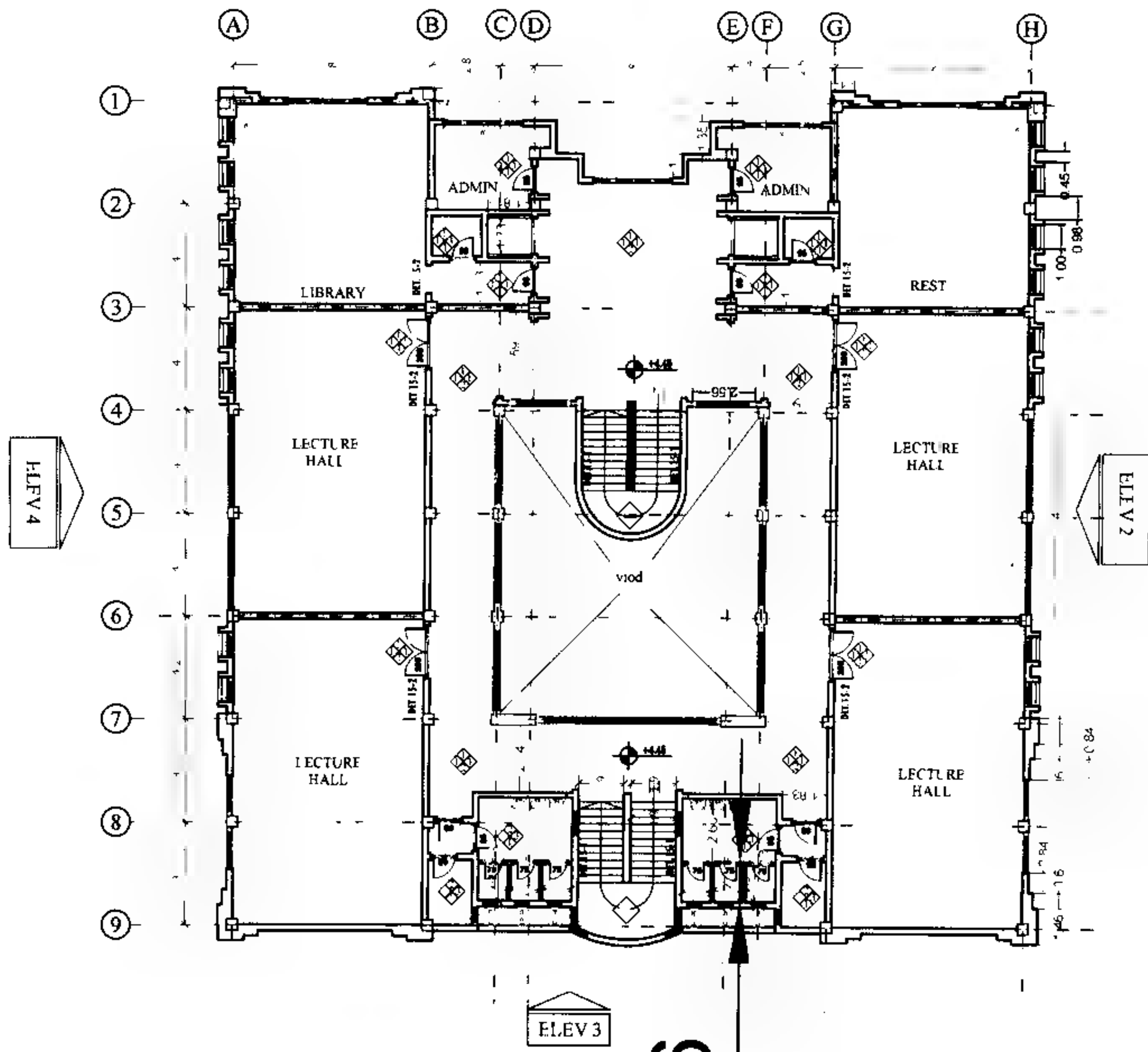
٣-١ وصف البناية

تم اختيار بناية تقع في محافظة بغداد وهي قسم دراسي في الجامعة الاسلامية بمساحة ١١٢٠ متر مربع و البناية تتكون من اربع طوابق و هي مؤلفة من هيكل خرساني من الاعمدة ة العتبات و البلاطات الخرسانية و تستند البناية الى اساس حصيري.

تم تحليل البناية و تصميمها بالاعتماد على المواصفة الامريكية

. (ACI 318M-code)

تفاصيل البناية مبينة في المخططات المعمارية التالية :



Notes:-

CLIENT :

PROJECT :

BUILDING :

Department Building

DRAWING TITLE :

FIRST FLOOR PLAN

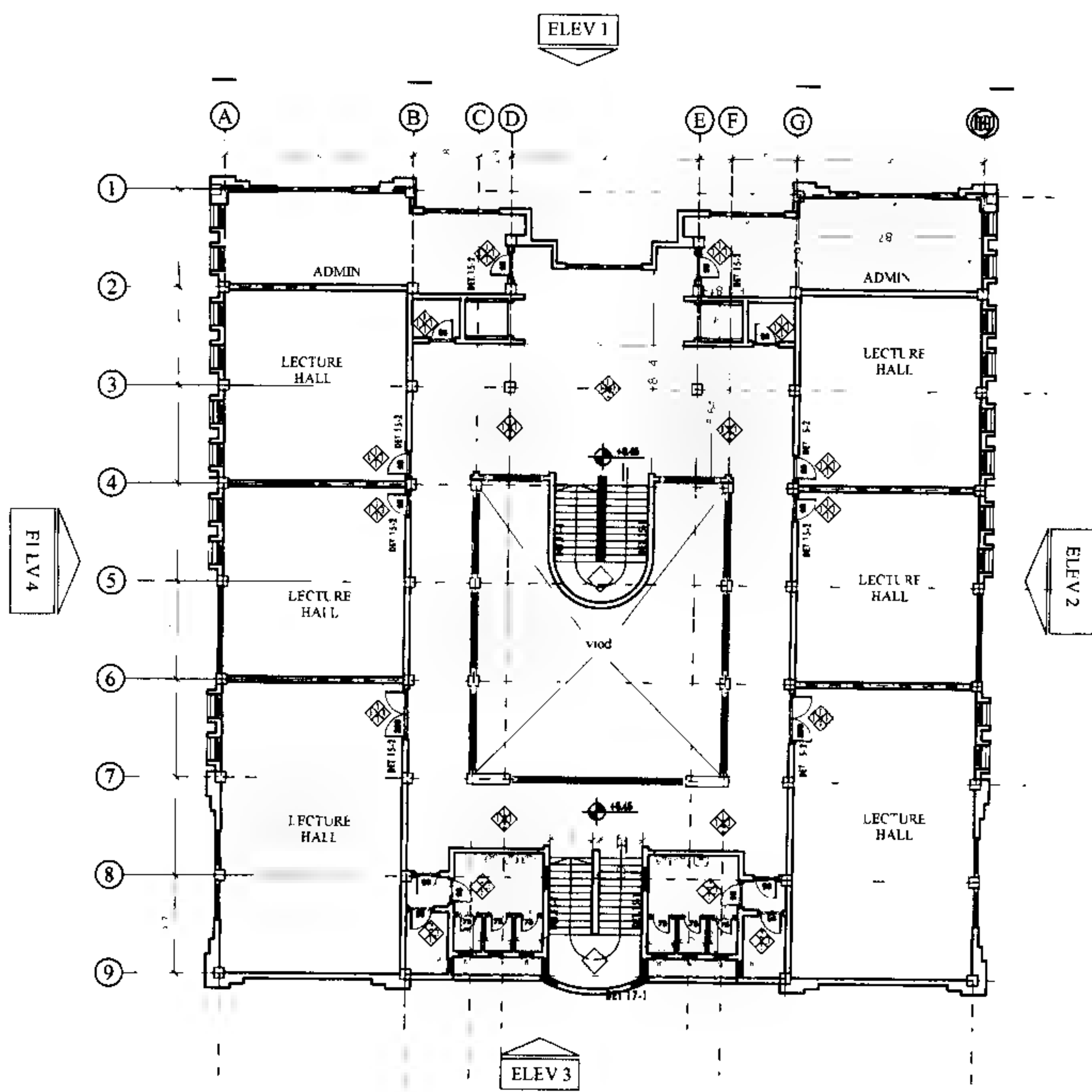
CONSULTANT

Scientific & Engineering Consultants Beauru

UNIVERSITY OF TECHNOLOGY

DESIGNED BY :

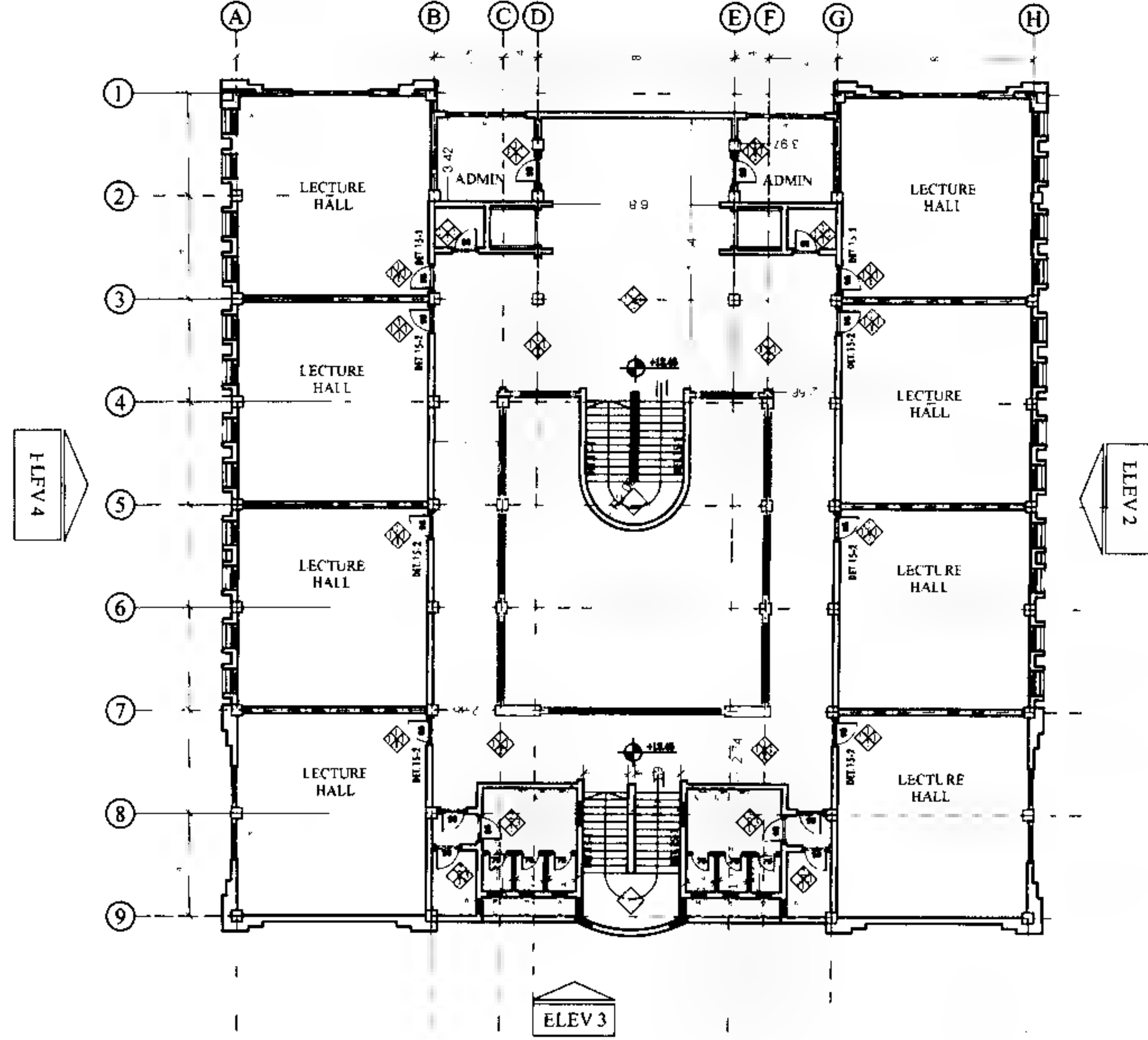
SCALE	SHEET	DATE	DWG NO.	REV. NO.
AS SHOWN	A2			



Notes:-

CLIENT	
PROJECT	
BUILDING	Department Building
DRAWING TITLE :	SECOND FLOOR PLAN
CONSULTANT	Scientific & Engineering Consultants Beauru UNIVERSITY OF TECHNOLOGY
DESIGNED BY :	

SCALE	SIZE	DATE	DWG NO.	DET. NO.
AS SHOWN	A3			



Notes:-

CLIENT :

PROJECT :

BUILDING :

Department Building

DRAWING TITLE :

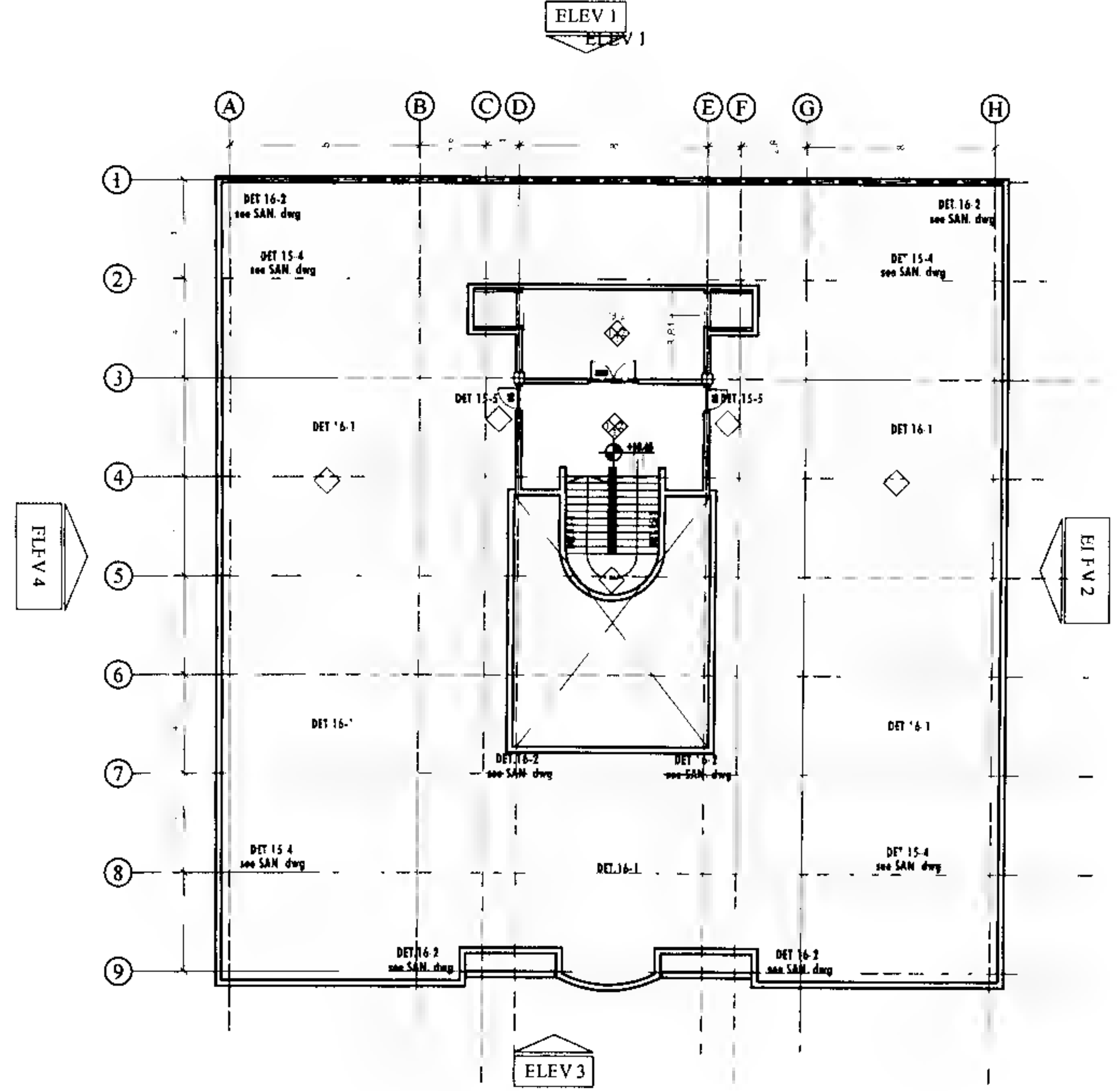
THIRD FLOOR PLAN

CONSULTANT

Scientific & Engineering Consultants Beaure
UNIVERSITY OF TECHNOLOGY

DESIGNED BY :

SCALE :	SIZE:	DATE	DWG No.	REV. No.
	A3			



Notes:-

CLIENT :
PROJECT :
BUILDING : Department Building
DRAWING TITLE : ROOF PLAN -1-
CONSULTANT : Scientific & Engineering Consultants Bureau UNIVERSITY OF TECHNOLOGY
DESIGNED BY :

SCALE	SIZE	DATE	DWG NO.	REV NO.
	A3			

ELEV 1

A B C D E F G H

1 2 3 4 5 6 7 8 9

DET 16-2 see SAN dwg

DET 16-2 see SAN dwg

DET 16-1

DET 16-2 see SAN dwg

DET 16-2 see SAN dwg

ELEV 4

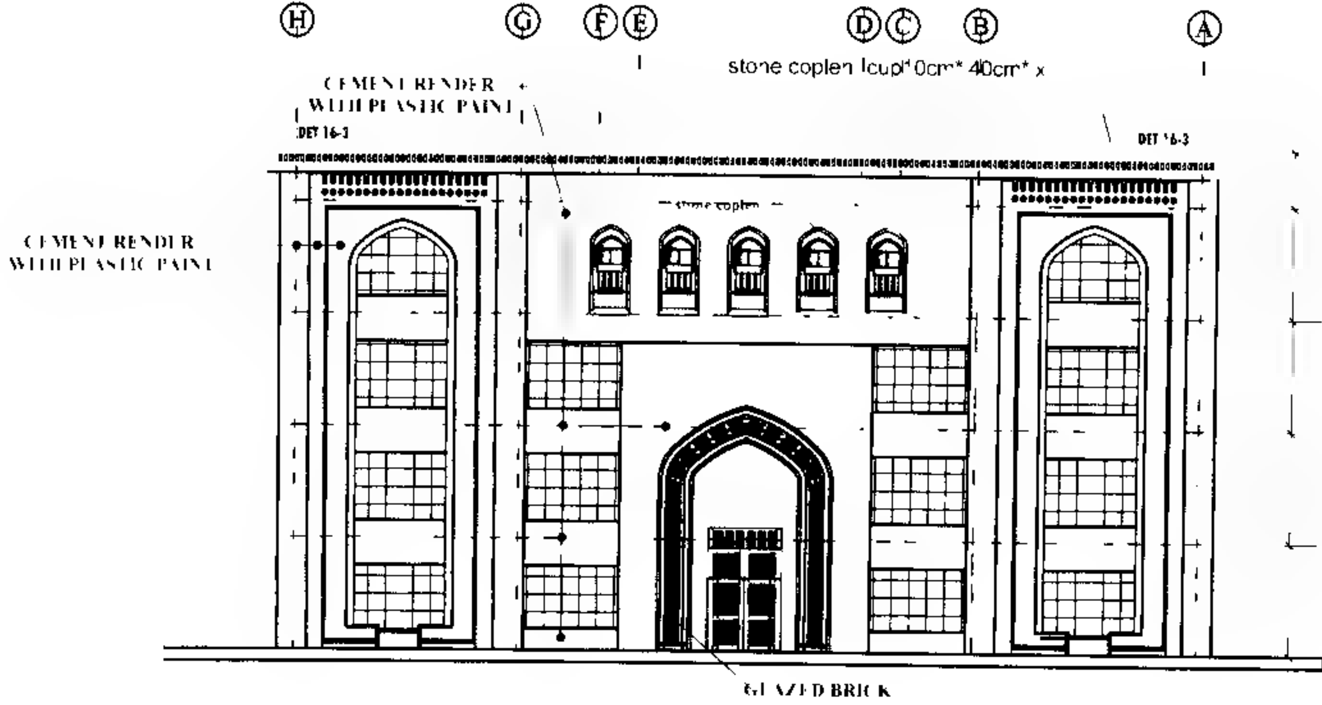
ELEV 2

ELEV 3

Notes:-

CLIENT:	
PROJECT:	
BUILDING:	Department Building
DRAWING TITLE:	ROOF PLAN-2-
CONSULTANT:	Scientific & Engineering Consultants Bureau UNIVERSITY OF TECHNOLOGY
DESIGNED BY:	

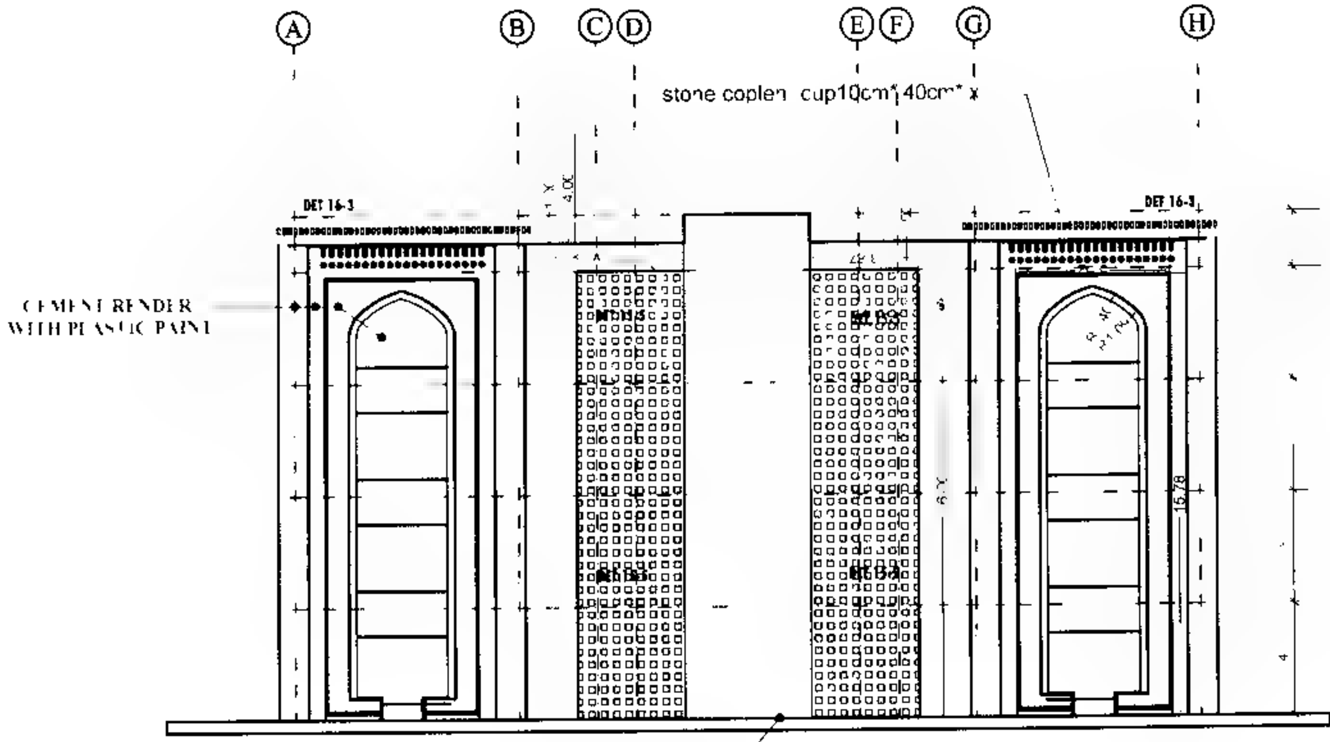
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as shown	A3			



Notes:-

CLIENT
PROJECT
BUILDING
Department Building
DRAWING TITLE:
ELEV.-1-
CONSULTANT:
Scientific & Engineering Consultants Bureau UNIVERSITY OF TECHNOLOGY
DESIGNED BY:

SCALE	SIZE	DATE	DWG NO.	REV NO.
AS SHOWN	A3			



Notes:-

CLIENT	
PROJECT:	
BUILDING:	Department Building
DRAWING TITLE:	ELEV.-3-
CONSULTANT:	Scientific & Engineering Consultants Beaury UNIVERSITY OF TECHNOLOGY
DESIGNED BY:	

SCALE	AREA	DATE	DWG NO.	REV. NO.
AS SHOWN	A2			

٣-٢ ابعاد المقاطع الانشائية

• الاعمدة column

تم اختيار مقاطع الاعمدة حسب المخططات المعمارية وكانت الابعاد كالاتي

١. **0.45*1.85**
٢. **0.45*1.00**
٣. **0.45*0.45**

• الروافد beams

h =(L*(0.4+Fy/700))/18.5   one edge con.

=(8*(0.4+420/700))/18.5

=0.432 m

h =(L*(0.4+Fy/700))/21   two edge con.

=(10.8*(0.4+420/700))/21

=0.514 m

Use h =0.6

Dim. Of beam =0.6*0.3

لكن في مناطق اخرى كان torsion عالي ولم يتحمل المقطع مما ادى الى زيادة ابعاد المقطع واصبح (0.8*0.5) m .

• سمك السقف

h =(max parameter/180)≥90

=((10000+4200)*2)/180

=157.77 mm

Use h slab= 160 mm

٣-٢التحميل loading

•الاحمال الميتة

❖الحمل الذاتي **self weight**

و يتم حسابة بالاعتماد على الابعاد السابقة

❖احمال الارضيات

Plate load =(24*0.08+0.33)=2.25 Kn/m²

❖ احمال السطح

Plate load =(24*0.05+18*0.13+0.3+0.3)

=4.14 Kn/m²

❖ احمال الجدران

Member load=18*0.24*4=17.24 kn/m

❖ احمال القواطع الغير مستندة الى beam

Plate load =(18*0.24*4*2.25)/16=2.5 kn/m²

• الاحمال الحية live load

- ❖ الممرات والدرج $5\ kn/m^2$
- ❖ الغرف الدراسية $2\ kn\ /m^2$
- ❖ السطح $1.5\ kn/m^2$

• احمال الرياح wind load

هنا اهملنا تاثير حمل الرياح لانة ارتفاع البناية 16.5m و المواصفة تشترط ان يكون ارتفاع البناية 19m حتى يدخل تاثير wind load.

٣-٤ طريقة الإدخال

- بعد تشغيل البرنامج تظهر الشاشة ادناه والتي يتم من خلالها تعين نوعية المنشا وكذلك وحدة القياس الطول والقوة

اختيار نوعية المنشأ

Space
Floor
Truss

File Name :
PORTAL
Location

A PLANE structure is bound by a global X-Y coordinate system with loads in the same plane.

ادخال وحدة الطول

Length Units
Inch
Foot
Millimeter
Centimeter
Decimeter
Meter
Kilometer

Force Units
Pound
KiloPound
Kilogram
Metric Ton
Newton
DecaNewton
KiloNewton
MegaNewton

ادخال وحدة القوة

Display this dialog box at the Startup
Back | Next > | Cancel | Help

- بعد ذلك تظهر النافذة التالية التي تتم من خلالها عملية الاضافة

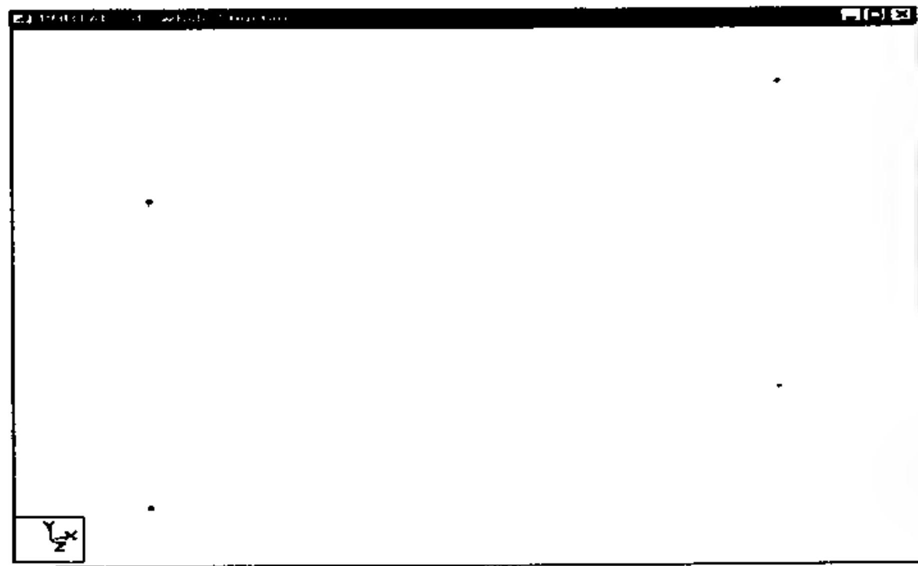
Add Plate
Add Solid
Open Structure Wizard
Open STAAD Editor
Edit Job Information

تظهر انواع الاختيارات

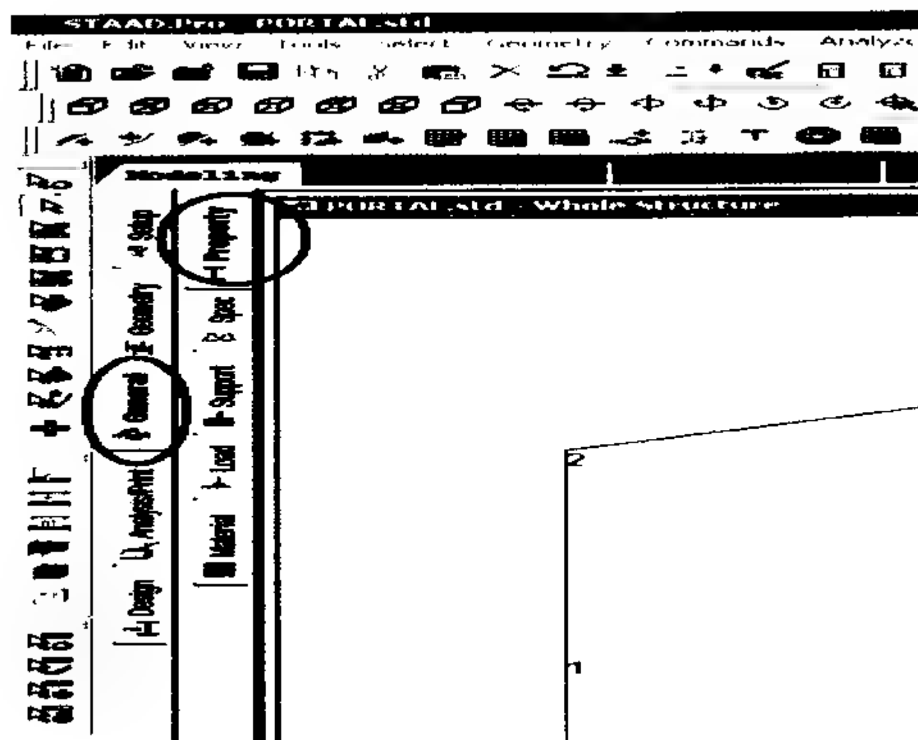
Begin building your model by creating new joints and beams using the construction grid, drawing tools and spreadsheets.

Display this dialog box at the Startup
< Back | Finish | Cancel | Help

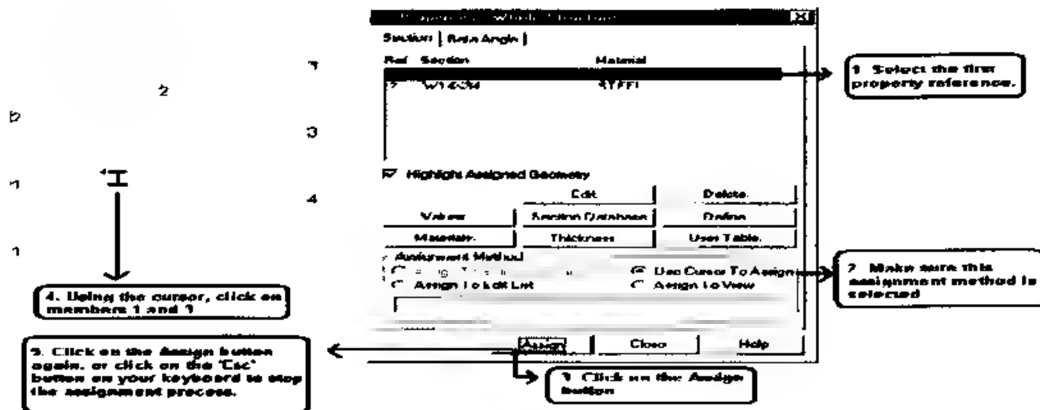
- سناخذ هذا المثال البسيط لبيان عملية modeling



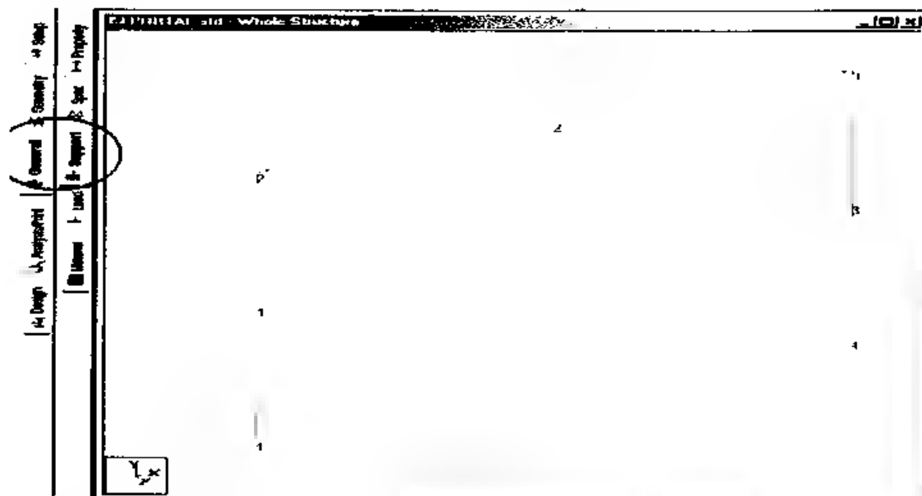
- نبدا عملية ال modeling بادخال خصائص المقاطع

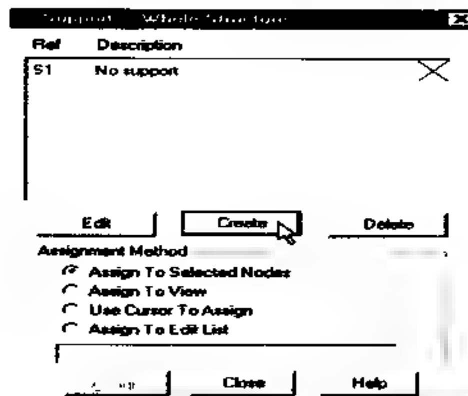


• هذا مثال يبين كيفية اختيار المقاطع وكذلك تخصيصها

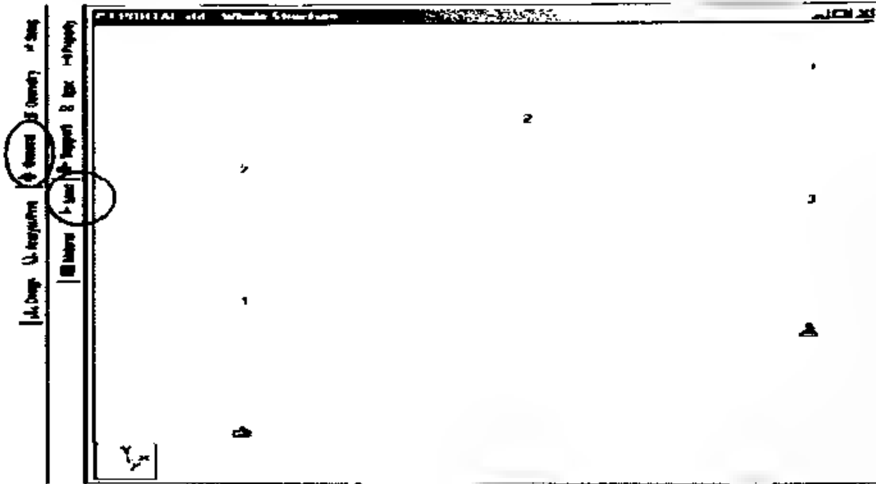


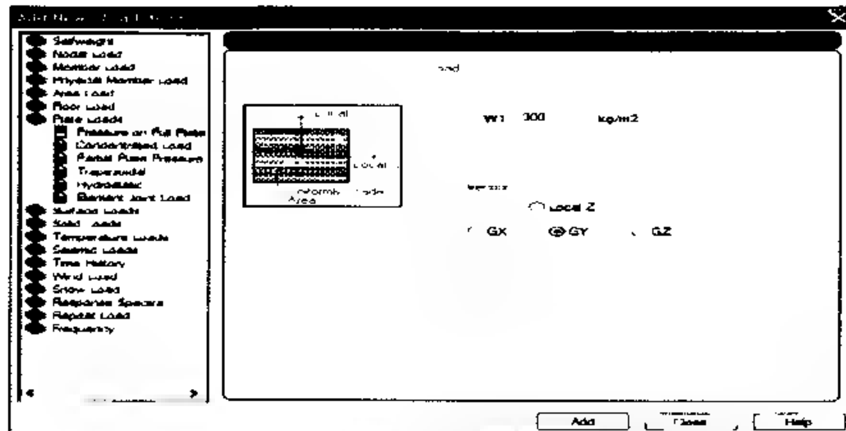
• نبدا بالمرحلة الثانية وهي ادخال support



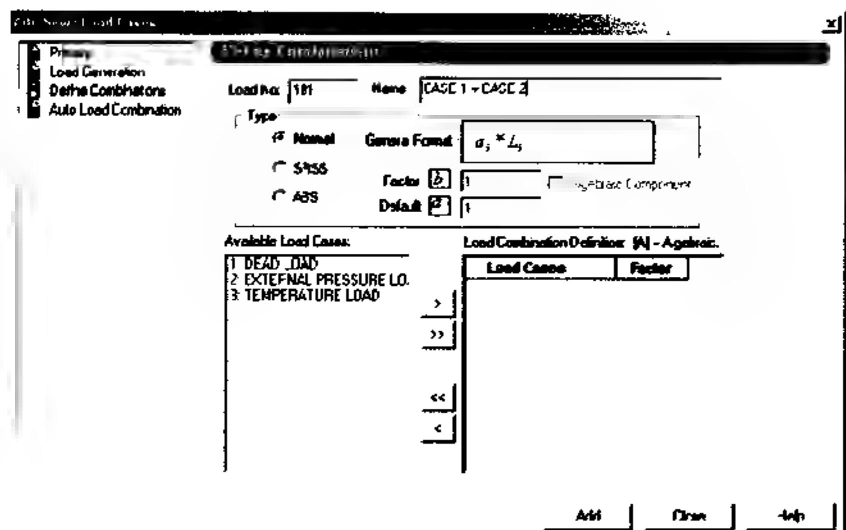


• نبدا بالمرحلة الثالثة وهي ادخال load

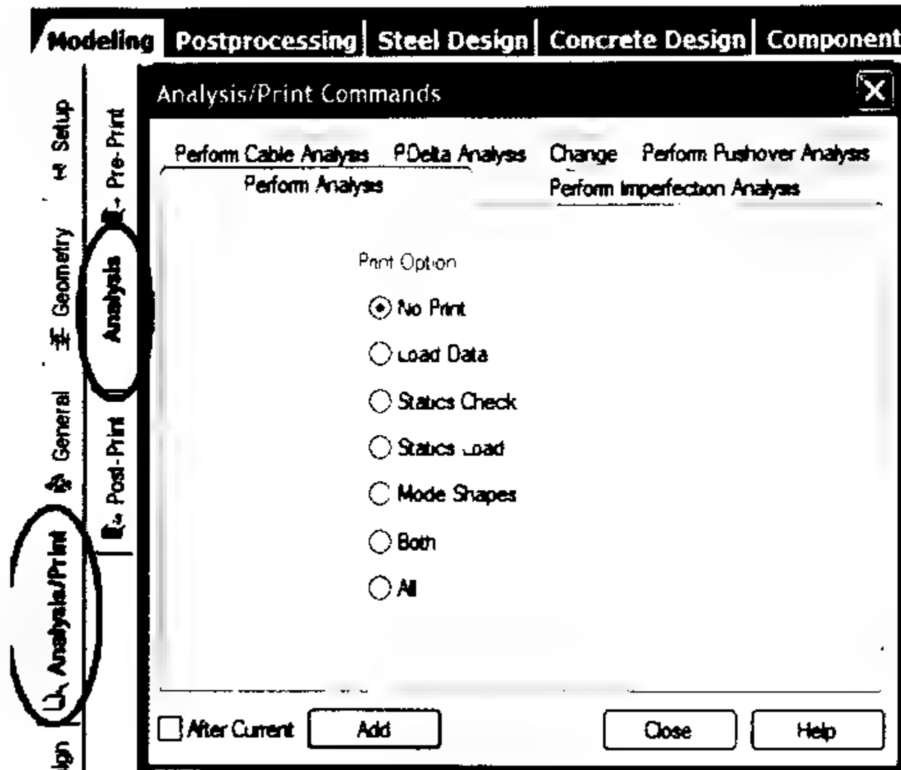


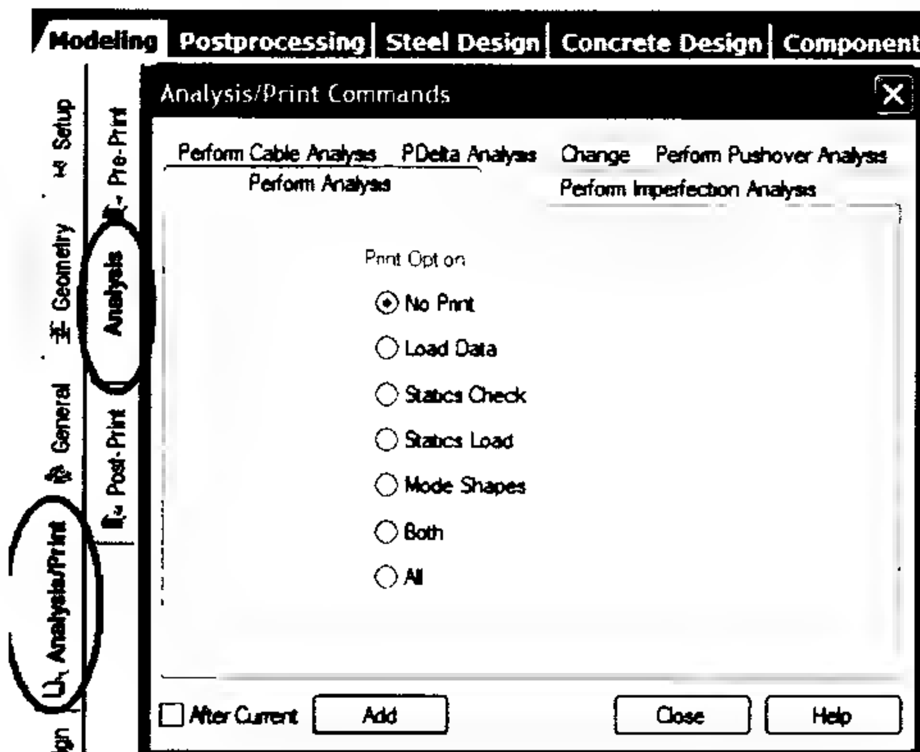


• في بعض الاحيان نعمل load combination لتمثيل الواقع



• بعد الانتهاء من عملية modeling نبدا بمرحلة Analysis





• مرحلة design

• اثناء مرحلة التحليل يمكن الحصول على النتائج على شكل واجهة رسومية

ملف الأطفال

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    5. CHECKER NAME DR ALAA K.
    6. JOB NAME BLUIDING DEPARTMENT
    7. JOB CLIENT UNIVERSITY OF TECNOLOGY
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الفصل الرابع

الفصل الرابع

Job Information

	Engineer	Checked	Approved
Name:	yasir w.j	Dr alaa k	
Date:	05-Dec-10		

Structure Type	SPACE FRAME

Number of Nodes	9202	Highest Node	9202
Number of Elements	2879	Highest Beam	11518
Number of Plates	6639	Highest Plate	11494

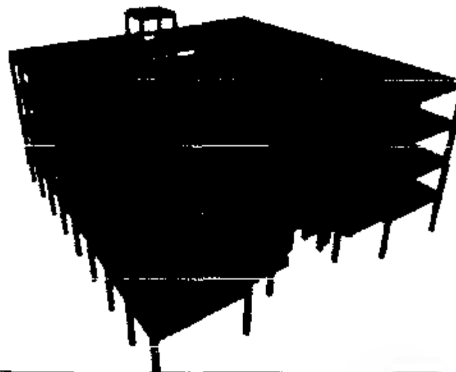
Number of Basic Load Cases	3
Number of Combination Load Cases	3

Included in this printout are data for

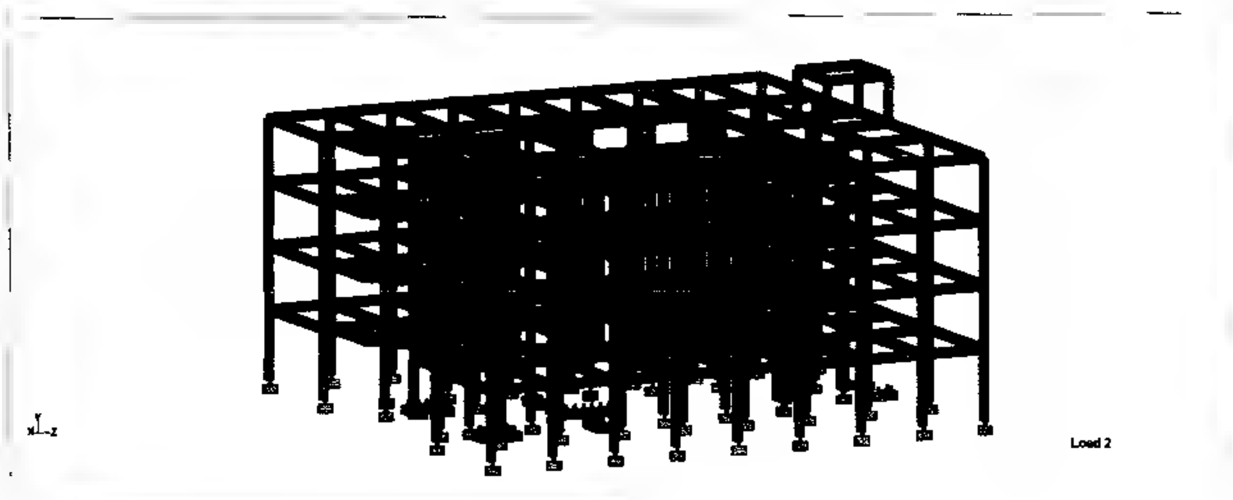
All	The Whole Structure

Included in this printout are results for load cases

Type	L/C	Name
Primary	1	DEAD
Primary	2	SELF
Primary	3	LIVE
Combination	4	COMBINATION LOAD CASE 4
Combination	5	COMBINATION LOAD CASE 5
Combination	6	COMBINATION LOAD CASE 6



3D Rendered View



Whole Structure

Section Properties

Prop	Section	Area (cm²)	I_{yy} (cm⁴)	I_{zz} (cm⁴)	J (cm⁴)	Material
7	Rect 0.60x0.30	1.8E+3	135E+3	540E+3	371E+3	CONCRETE
8	Rect 0.60x0.30	1.8E+3	135E+3	540E+3	371E+3	CONCRETE
9	Rect 0.60x0.30	1.8E+3	135E+3	540E+3	371E+3	CONCRETE
10	Rect 0.60x0.30	1.8E+3	135E+3	540E+3	371E+3	CONCRETE
11	Rect 0.60x0.30	1.8E+3	135E+3	540E+3	371E+3	CONCRETE
12	Rect 0.60x0.30	1.8E+3	135E+3	540E+3	371E+3	CONCRETE
13	Rect 0.60x0.30	1.8E+3	135E+3	540E+3	371E+3	CONCRETE
14	Rect 0.60x0.30	1.8E+3	135E+3	540E+3	371E+3	CONCRETE
15	Rect 0.60x0.30	1.8E+3	135E+3	540E+3	371E+3	CONCRETE
16	Rect 0.60x0.30	1.8E+3	135E+3	540E+3	371E+3	CONCRETE
17	Rect 0.60x0.30	1.8E+3	135E+3	540E+3	371E+3	CONCRETE
18	Rect 0.60x0.30	1.8E+3	135E+3	540E+3	371E+3	CONCRETE
19	Rect 0.45x0.45	2.02E+3	342E+3	342E+3	577E+3	CONCRETE
20	Rect 0.80x0.50	4E+3	833E+3	2.13E+6	2.04E+6	CONCRETE
21	Rect 0.80x0.50	4E+3	833E+3	2.13E+6	2.04E+6	CONCRETE
22	Rect 1.00x0.45	4.5E+3	759E+3	3.75E+6	2.18E+6	CONCRETE
23	Rect 1.85x0.45	8.32E+3	1.4E+6	23.7E+6	4.76E+6	CONCRETE



Plate Thickness

Prop	Node A (cm)	Node B (cm)	Node C (cm)	Node D (cm)	Material
1	24.000	24.000	24.000	24.000	CONCRETE
2	45.000	45.000	45.000	45.000	CONCRETE
3	16.000	16.000	16.000	16.000	CONCRETE
4	16.000	16.000	16.000	16.000	CONCRETE
5	16.000	16.000	16.000	16.000	CONCRETE
6	16.000	16.000	16.000	16.000	CONCRETE

Materials

Mat	Name	E (kN/mm^2)	v	Density (kg/m^3)	α (1/°K)
1	STEEL	205.000	0.300	7.83E+3	12E-6
2	STAINLESSSTEEL	197.930	0.300	7.83E+3	18E-6
3	ALUMINUM	68.948	0.330	2.71E+3	23E-6
4	CONCRETE	21.718	0.170	2.4E+3	10E-6

Supports

Node	X (kN/mm)	Y (kN/mm)	Z (kN/mm)	rX (kN·m/deg)	rY (kN·m/deg)	rZ (kN·m/deg)
73	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
74	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
75	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
76	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
77	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
78	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
79	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
80	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
81	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
82	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
83	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
84	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
85	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
86	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
87	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
88	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
89	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
90	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
91	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
92	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
93	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
94	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
95	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
96	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed

Supports Cont...

Node	X (kN/mm)	Y (kN/mm)	Z (kN/mm)	rX (kN·m/deg)	rY (kN·m/deg)	rZ (kN·m/deg)
97	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
98	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
99	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
100	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
101	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
102	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
103	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
104	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
105	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
106	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
107	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
108	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
109	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
110	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
111	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
112	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
113	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
114	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
115	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
116	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
117	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
118	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
119	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
120	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
121	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
122	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
123	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
124	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
125	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
129	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
130	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
131	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
132	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
133	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
140	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
143	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
150	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
164	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
165	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
166	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
167	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
168	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
169	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
176	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
243	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed

Supports Cont...

Node	X (kN/mm)	Y (kN/mm)	Z (kN/mm)	rX (kN·m/deg)	rY (kN·m/deg)	rZ (kN·m/deg)
244	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
245	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
246	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
447	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
740	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
1295	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
6558	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
6565	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
6697	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
6698	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
6787	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
6801	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7073	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7074	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7081	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7085	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7106	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7107	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7315	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7320	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7321	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7322	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7422	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7423	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7595	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7599	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7724	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7737	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7746	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7755	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7756	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7922	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
9200	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
9201	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
9202	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed

Basic Load Cases

Number	Name
2	SELF
3	LIVE
1	DEAD

Combination Load Cases

Comb.	Combination L/C Name	Primary	Primary L/C Name	Factor
4	COMBINATION LOAD CASE 4	2	SELF	1.00
		3	LIVE	1.00
		1	DEAD	1.00
5	COMBINATION LOAD CASE 5	2	SELF	1.20
		1	DEAD	1.20
		3	LIVE	1.60
6	COMBINATION LOAD CASE 6	2	SELF	1.40
		1	DEAD	1.40

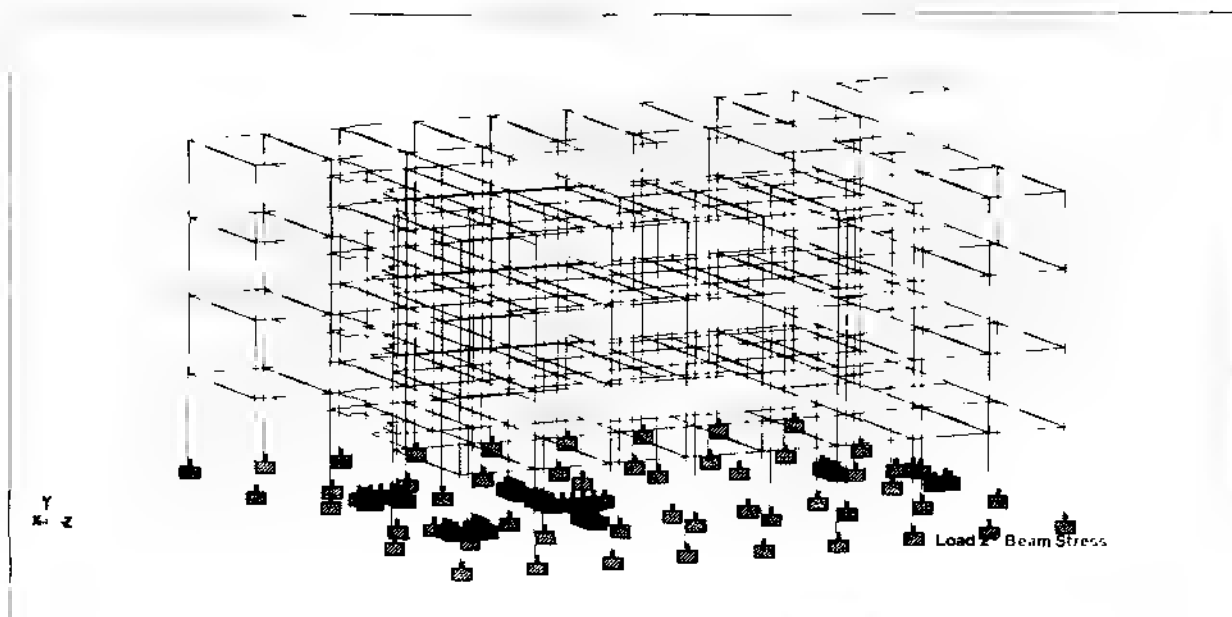
Node Displacement Summary

	Node	L/C	X (mm)	Y (mm)	Z (mm)	Resultant (mm)	rX (rad)	rY (rad)	rZ (rad)
Max X	1281	5:COMBINATIC	**5.869**	-2.498	-0.385	6.390	0.001	0.001	0.000
Min X	137	5:COMBINATIC	**-0.726**	-2.306	0.196	2.425	0.001	-0.000	0.000
Max Y	73	1:DEAD	0.000	**0.000**	0.000	0.000	0.000	0.000	0.000
Min Y	6059	6:COMBINATIC	-0.147	**-14.837**	-1.168	14.883	0.000	-0.000	-0.001
Max Z	1282	5:COMBINATIC	4.418	-3.783	**1.209**	5.940	-0.001	0.001	0.001
Min Z	7898	5:COMBINATIC	-0.139	-4.313	**-3.312**	5.440	-0.000	-0.000	-0.000
Max rX	8911	5:COMBINATIC	-0.259	-4.574	-0.680	4.631	**0.003**	-0.000	-0.001
Min rX	6310	5:COMBINATIC	-0.229	-4.369	-1.121	4.517	**-0.004**	0.000	-0.000
Max rY	7383	5:COMBINATIC	3.834	-1.333	-0.483	4.087	-0.000	**0.001**	0.001
Min rY	7211	5:COMBINATIC	0.645	-5.954	-0.306	5.996	-0.001	**-0.001**	0.002
Max rZ	6438	6:COMBINATIC	-0.295	-7.341	-1.166	7.439	0.000	0.000	**0.004**
Min rZ	6064	6:COMBINATIC	-0.137	-7.371	1.171	7.465	0.000	-0.000	**-0.004**
Max Rst	6059	6:COMBINATIC	-0.147	-14.837	-1.168	**14.883**	0.000	-0.000	-0.001

Beam Displacement Detail Summary

Displacements shown in italic indicate the presence of an offset

	Beam	L/C	d (m)	X (mm)	Y (mm)	Z (mm)	Resultant (mm)
Max X	6320	5:COMBINATIC	1.350	**1.219**	-1.172	-0.062	1.693
Min X	104	6:COMBINATIC	1.200	**-1.464**	-3.880	-1.063	4.281
Max Y	21	1:DEAD	4.500	0.000	**0.000**	0.000	0.000
Min Y	427	6:COMBINATIC	0.600	-0.154	**-13.948**	-1.168	13.998
Max Z	2160	5:COMBINATIC	1.350	-0.039	-0.772	**0.451**	0.895
Min Z	2168	5:COMBINATIC	0.105	-0.139	-4.304	**-3.312**	5.433
Max Rst	427	6:COMBINATIC	0.600	-0.154	-13.948	-1.168	**13.998**



Whole Structure Beam Stress 5e+007mm.m 2 SELF

Beam End Force Summary

The signs of the forces at end B of each beam have been reversed For example this means that the Min Fx entry gives the largest tension value for an beam

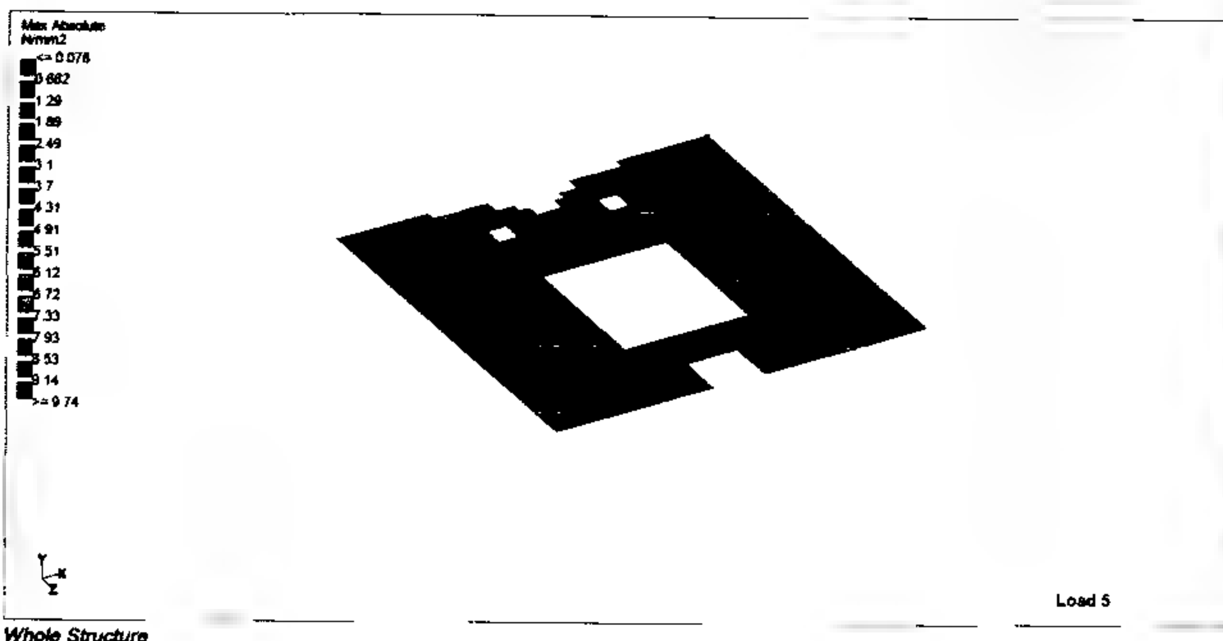
				Axial	Shear		Torsion	Bending	
	Beam	Node	L/C	Fx (kN)	Fy (kN)	Fz (kN)	Mx (kNm)	My (kNm)	Mz (kNm)
Max Fx	2675	108	5 COMBINATIC	**2.83E+3**	27 725	-12.030	-0.508	-20.379	8.481
Min Fx	2537	56	5 COMBINATIC	**-120.060**	-442 560	-19 905	-21 938	7.668	34.094
Max Fy	1888	6159	6 COMBINATIC	-31 703	**491.203**	-1 257	54 086	-0.060	293 304
Min Fy	2537	128	5 COMBINATIC	-120 060	**-456.184**	-19 905	-21.938	-0.808	225.436
Max Fz	2166	1052	5 COMBINATIC	499 085	24 863	**79.847**	-0.660	-169.088	56 722
Min Fz	2639	788	5 COMBINATIC	575 865	22 478	**-49.524**	0 025	99.855	44.093
Max Mx	1661	6089	6 COMBINATIC	24.559	207 648	-5.479	**157.185**	0.333	-37 714
Min Mx	3028	1036	6 COMBINATIC	24 623	-191 822	4.801	**-158.144**	-1 780	-125.104
Max My	2418	812	5 COMBINATIC	483 358	-27 257	79 733	0 084	**153.823**	42.263
Min My	2166	1052	5 COMBINATIC	499 065	24 863	79 847	-0.660	**-169.088**	56 722
Max Mz	1930	504	5 COMBINATIC	36.078	312 178	-0.014	-88.269	-1.407	**508.231**
Min Mz	8146	5428	5 COMBINATIC	35 528	1 353	-0 002	-1.913	-0.009	**-407.886**



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Plate Centre Stress Summary

			Shear		Membrane			Bending		
	Plate	L/C	Qx (N/mm²)	Qy (N/mm²)	Sx (N/mm²)	Sy (N/mm²)	Sxy (N/mm²)	Mx (kNm/m)	My (kNm/m)	Mxy (kNm/m)
Max Qx	11137	5:COMBINATIC	**0.759**	0.734	-0.454	-1 307	0.101	31 689	35.890	0 095
Min Qx	11148	5:COMBINATIC	**-0.799**	0.776	0.513	1 174	0 190	32.835	35 836	-0.233
Max Qy	11148	5:COMBINATIC	-0 799	**0.776**	0.513	1 174	0 190	32.835	35.836	-0.233
Min Qy	11485	5 COMBINATIC	-0 245	**-0.743**	-0.014	-0 122	0 024	15 516	6.691	3.608
Max Sx	8944	5:COMBINATIC	-0.573	-0 146	**2.116**	0.405	0 433	25.072	9.368	14.406
Min Sx	9000	5:COMBINATIC	0 038	-0.002	**-4.716**	-0.801	0 462	3 167	0 538	0.264
Max Sy	5549	5:COMBINATIC	-0.688	0.697	0 495	**1.616**	-0 134	28 961	34.489	-0.815
Min Sy	7892	6:COMBINATIC	-0.073	0.052	-1.267	**-4.929**	1 153	-1.058	-6.369	2.643
Max Sxy	6910	5:COMBINATIC	-0.044	-0 022	-1.906	-1 011	**2.009**	-7.640	-4.421	-0.188
Min Sxy	8902	5:COMBINATIC	-0.016	-0.017	-2.555	-1 505	**-1.909**	2 990	0.842	1 597
Max Mx	9248	5:COMBINATIC	-0.737	0.494	-0.001	-0 695	0 074	**75.473**	33.316	5.673
Min Mx	8839	5:COMBINATIC	0.748	-0 480	-0.062	0 450	-0 046	**-79.013**	-32.693	-7.258
Max My	9544	5:COMBINATIC	0.025	-0 140	-0.743	2 677	1 582	11.039	**77.460**	-14.097
Min My	9539	5:COMBINATIC	-0.022	0.136	-0.358	-1 394	0 777	-10 104	**-76.297**	12.856
Max Mxy	9510	5:COMBINATIC	-0.060	0.138	-0.173	0 112	-0 138	-13 962	-55 445	**26.028**
Min Mxy	9520	5:COMBINATIC	0.069	-0 146	-0.455	0 548	-0 263	17 354	55.523	**-26.063**



Whole Structure

Reaction Summary

			Horizontal	Vertical	Horizontal	Moment		
	Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
Max FX	164	6:COMBINATIC	**112.074**	884 328	-73.121	52 509	-1 396	18 671
Min FX	165	6:COMBINATIC	**-107.818**	832 626	-79 660	50 084	1 470	-16 006
Max FY	108	5 COMBINATIC	-27 725	**2.83E+3**	12 030	20 379	-0 508	-8 481
Min FY	166	3 LIVE	1,618	**-9.768**	-9.530	-4 201	0 180	-0 656
Max FZ	7599	5 COMBINATIC	-2 121	87 078	**93.938**	19 155	7 115	-3 834
Min FZ	165	5:COMBINATIC	-97 884	811.395	**-81.026**	48 331	1 606	-15 527
Max MX	164	6 COMBINATIC	112 074	884.328	-73.121	**52.509**	-1 396	18 671
Min MX	166	6 COMBINATIC	1.999	325 347	29.845	**-56.244**	1 975	-6 771
Max MY	7599	5.COMBINATIC	-2 121	87 078	93.938	-19 155	**7.115**	-3 834
Min MY	114	5:COMBINATIC	-0 240	256.216	65.677	-23 893	**-5.059**	5.317
Max MZ	100	5 COMBINATIC	-40.290	1 65E+3	0.480	1 426	-0 012	**59.582**
Min MZ	111	5 COMBINATIC	55 320	2 8E+3	10.646	17 266	1 159	**-112.481**

Reactions

		Horizontal	Vertical	Horizontal	Moment		
Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
73	1.DEAD	10.475	653 965	1.038	2.074	0 024	-15 871
	2:SELF	9 919	465.592	-0 040	0.040	0 015	-14 967
	3 LIVE	3 960	119 679	0.008	0.008	0 013	-6 014
	4.COMBINATIC	24.354	1 24E+3	1.005	2.122	0.051	-36 652
	5 COMBINATIC	30 606	1 53E+3	1 209	2.550	0 067	-46 628
	6.COMBINATIC	28 552	1 57E+3	1.396	2.960	0 054	-43 173
74	1 DEAD	8.847	704.697	-0 155	0.291	0 008	-13 407
	2.SELF	9 660	538 682	0 065	0 185	0 008	-14 541
	3 LIVE	3 378	127.447	-0.020	-0.042	0.007	-5 121
	4 COMBINATIC	21 884	1 37E+3	-0 111	0.435	0.023	-33 070
	5.COMBINATIC	27.612	1 7E+3	-0 141	0.505	0 030	-41 732
	6 COMBINATIC	25.909	1 74E+3	-0.127	0.667	0 023	-39 128
75	1.DEAD	16 762	752 941	0 314	0.977	0.000	-25 145
	2 SELF	10.233	468 736	0.097	0.224	-0 001	15 395
	3 LIVE	4 169	121 996	-0 066	-0.148	-0 000	-6 292
	4 COMBINATIC	31.165	1 34E+3	0 325	1.054	-0 001	-46 832
	5:COMBINATIC	39.065	1 66E+3	0 355	1.205	-0 001	-58 715
	6:COMBINATIC	37 793	1 71E+3	0.576	1.682	-0.001	-56 756
76	1:DEAD	11 210	695 325	1.007	2.011	0 004	-16 916
	2.SELF	10.337	467 398	0.009	0.095	-0 003	15 558
	3.LIVE	4.229	121 185	0 023	0.013	-0 003	-6 387
	4:COMBINATIC	25 775	1 28E+3	1.040	2 119	-0 002	-38 862
	5 COMBINATIC	32.622	1 59E+3	1 257	2.548	-0 004	-49 169
	6.COMBINATIC	30.165	1 63E+3	1 423	2.947	0 001	-45 464
77	1:DEAD	9 220	706 107	-0.080	0.416	0 009	-13 961

Reactions Cont...

		Horizontal	Vertical	Horizontal	Moment		
Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
	2:SELF	10.231	530.644	0.061	0.183	0.001	-15.402
	3:LIVE	3.696	122.833	-0.034	-0.067	-0.002	-5.604
	4:COMBINATIC	23.147	1.36E+3	-0.053	0.531	0.008	-34.967
	5:COMBINATIC	29.254	1.68E+3	-0.077	0.611	0.008	-44.201
	6:COMBINATIC	27.231	1.73E+3	-0.027	0.837	0.013	-41.108
78	1:DEAD	17.761	746.827	0.384	1.113	0.010	-26.569
	2:SELF	10.340	469.295	0.117	0.276	0.003	-15.562
	3:LIVE	4.241	121.357	-0.074	-0.121	-0.001	-6.417
	4:COMBINATIC	32.341	1.34E+3	0.427	1.268	0.012	-48.547
	5:COMBINATIC	40.506	1.65E+3	0.483	1.474	0.014	-60.823
	6:COMBINATIC	39.341	1.7E+3	0.702	1.945	0.019	-58.983
79	1:DEAD	11.501	740.701	0.495	1.282	0.009	-17.307
	2:SELF	10.578	465.397	0.125	0.293	0.003	-15.908
	3:LIVE	4.421	124.448	-0.006	-0.016	-0.001	-6.687
	4:COMBINATIC	26.500	1.33E+3	0.614	1.560	0.011	-39.902
	5:COMBINATIC	33.568	1.65E+3	0.735	1.866	0.013	-50.557
	6:COMBINATIC	30.910	1.69E+3	0.866	2.206	0.017	-46.500
80	1:DEAD	13.687	569.377	3.961	6.417	-0.032	-20.531
	2:SELF	6.772	303.517	2.251	3.444	-0.013	-10.271
	3:LIVE	2.411	60.836	0.833	1.228	-0.006	-3.716
	4:COMBINATIC	22.671	933.729	7.045	11.089	-0.050	-34.516
	5:COMBINATIC	28.409	1.14E+3	8.788	13.798	-0.063	-42.908
	6:COMBINATIC	28.643	1.22E+3	8.697	13.806	-0.062	-43.122
81	1:DEAD	-8.268	815.811	0.044	0.567	0.009	12.044
	2:SELF	-7.410	567.297	-0.141	-0.105	-0.001	10.764
	3:LIVE	-2.975	164.150	-0.032	-0.039	-0.004	4.280
	4:COMBINATIC	-18.654	1.55E+3	-0.129	0.424	0.004	27.089
	5:COMBINATIC	-23.575	1.92E+3	-0.168	0.494	0.004	34.218
	6:COMBINATIC	-21.950	1.94E+3	-0.136	0.648	0.012	31.931
82	1:DEAD	-10.523	927.928	0.957	1.914	0.014	15.345
	2:SELF	-6.184	630.519	0.646	1.055	0.003	8.941
	3:LIVE	-1.983	222.054	0.732	1.088	-0.002	2.810
	4:COMBINATIC	-18.689	1.78E+3	2.335	4.057	0.015	27.098
	5:COMBINATIC	-23.220	2.23E+3	3.095	5.303	0.017	33.639
	6:COMBINATIC	-23.389	2.18E+3	2.244	4.157	0.024	34.000
83	1:DEAD	-6.466	922.289	-0.018	0.470	0.009	9.271
	2:SELF	-6.412	763.792	-0.005	0.083	-0.000	9.240
	3:LIVE	-1.950	281.765	-0.208	-0.314	-0.003	2.751
	4:COMBINATIC	-14.828	1.99E+3	-0.230	[illegible]	0.006	21.262
	5:COMBINATIC	-18.573	2.5E+3	-0.359	0.161	0.006	26.615
	6:COMBINATIC	-18.029	2.39E+3	-0.032	0.774	0.013	25.916
84	1:DEAD	-6.862	807.282	0.762	1.611	-0.001	9.870
	2:SELF	-6.267	616.936	-0.203	-0.226	-0.004	9.053
	3:LIVE	-2.051	232.176	-0.038	-0.078	-0.003	2.921

Reactions Cont...

		Horizontal	Vertical	Horizontal	Moment		
Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
	4 COMBINATIO	-15.179	1.66E+3	0 521	1.307	-0.008	21 844
	5 COMBINATIO	-19.036	2.08E+3	0 610	1.537	-0 011	27.381
	6 COMBINATIO	-18.380	1 99E+3	0 783	1.938	-0 007	26.492
85	1 DEAD	-5.538	763 650	0.239	0 811	0 013	7.925
	2 SELF	-5.650	680 838	0 321	0 515	0.011	8 157
	3 LIVE	-1.548	231 058	0.318	0.416	0 009	2 184
	4 COMBINATIO	-12.736	1.68E+3	0.879	1 745	0 033	18 267
	5 COMBINATIO	-15 902	2 1E+3	1 182	2.261	0.044	22 794
	6 COMBINATIO	-15.663	2 02E+3	0 785	1.858	0.033	22.516
86	1 DEAD	-10.804	850 452	0 109	0.634	0 002	15 721
	2 SELF	-6.284	601.795	0.013	0.077	-0 000	9 096
	3 LIVE	-2.065	224.980	-0 186	-0 311	0 001	2.953
	4 COMBINATIO	-19 153	1.68E+3	-0 084	0.400	0 002	27 770
	5 COMBINATIO	-23.810	2.1E+3	-0.151	0 355	0.003	34.505
	6 COMBINATIO	-23.923	2.03E+3	0 171	0.996	0 002	34 744
87	1 DEAD	-1.042	993 379	1 596	2.609	0.024	1 230
	2 SELF	3.596	712.806	-0.000	0.027	0 023	5 090
	3 LIVE	-0 133	268.404	-0.660	-1.041	0 018	0 068
	4 COMBINATIO	-4.771	1.97E+3	0.936	1 795	0 066	6 387
	5 COMBINATIO	-5.778	2.48E+3	0.859	1 738	0 086	7 692
	6 COMBINATIO	-6.493	2 39E+3	2.234	3.971	0 066	8.847
88	1 DEAD	-5 202	874 162	-4.628	-6.413	0.015	7 308
	2 SELF	2.550	456.287	-3 425	-5.049	0.021	3.457
	3 LIVE	-0.776	110.307	-1.559	-2 375	0 020	0 954
	4 COMBINATIO	-8.526	1 44E+3	-9.612	-13.837	0 056	11 720
	5 COMBINATIO	-10 544	1 77E+3	-12 158	17.555	0 076	14 446
	6 COMBINATIO	-10.852	1 86E+3	-11 275	-16.047	0 051	15.072
89	1 DEAD	5.052	895.071	-4 769	-6.666	0 006	-7.659
	2 SELF	2.736	465 176	-3.446	-5.033	0 003	-4.214
	3 LIVE	0.965	113.395	-1 557	-2.327	-0 003	-1 514
	4 COMBINATIO	8.753	1.47E+3	-9 773	-14.026	0 006	-13.387
	5 COMBINATIO	10.889	1.81E+3	-12.350	-17 762	0.006	-16.670
	6 COMBINATIO	10.903	1.9E+3	-11.502	-16.378	0 013	-16.623
90	1 DEAD	0.672	1.02E+3	1 656	2.857	-0 000	-1 180
	2 SELF	3.555	724.360	0 122	0.260	0 001	5.420
	3 LIVE	0.062	274 934	-0.579	-0.872	-0 002	-0.176
	4 COMBINATIO	4 289	2 02E+3	1 200	2.245	-0 001	-6 775
	5 COMBINATIO	5.171	2.53E+3	1 208	2.345	-0 001	-8.201
	6 COMBINATIO	5.917	2.44E+3	2 489	4 363	0 001	-9 240
91	1 DEAD	6.097	761 710	0.242	0 778	0 009	-9 195
	2 SELF	6.105	677.446	0.407	0.696	0.007	-9 184
	3 LIVE	1.795	229.806	0.389	0.572	0 001	-2 741
	4 COMBINATIO	13.997	1 67E+3	1 038	2.045	0 016	-21.119
	5 COMBINATIO	17.514	2.09E+3	1 401	2.683	0 020	-26 440

Reactions Cont...

Node	L/C	Horizontal FX (kN)	Vertical FY (kN)	Horizontal FZ (kN)	Moment MX (kNm)	MY (kNm)	MZ (kNm)
	6:COMBINATIC	17.083	2.01E+3	0.906	2.063	0.022	-25.730
92	1:DEAD	11.165	849.552	0.064	0.530	0.020	-16.637
	2:SELF	6.580	599.773	0.063	0.198	0.013	-9.848
	3:LIVE	2.242	224.185	-0.141	-0.203	0.004	-3.391
	4:COMBINATIC	19.987	1.67E+3	-0.014	0.525	0.037	-29.876
	5:COMBINATIC	24.881	2.1E+3	-0.073	0.549	0.046	-37.207
	6:COMBINATIC	24.843	2.03E+3	0.177	1.020	0.046	-37.079
93	1:DEAD	7.138	808.956	0.734	1.532	0.022	-10.600
	2:SELF	6.521	615.978	-0.159	-0.122	0.014	-9.711
	3:LIVE	2.225	232.191	-0.004	0.006	0.004	-3.351
	4:COMBINATIC	15.884	1.68E+3	0.571	1.416	0.040	-23.662
	5:COMBINATIC	19.051	2.08E+3	0.684	1.701	0.050	-29.735
	6:COMBINATIC	19.122	1.99E+3	0.806	1.974	0.050	-28.435
94	1:DEAD	6.830	921.894	-0.044	0.392	0.008	-10.068
	2:SELF	6.824	787.384	0.045	0.188	0.004	-10.106
	3:LIVE	2.253	[illegible]	-0.168	-0.228	0.001	-3.373
	4:COMBINATIC	15.907	2E+3	-0.167	0.352	0.012	-23.548
	5:COMBINATIC	19.990	2.51E+3	-0.288	0.331	0.015	-29.607
	6:COMBINATIC	19.116	2.39E+3	0.001	0.813	0.016	-28.244
95	1:DEAD	10.691	928.516	0.907	1.801	-0.006	-15.835
	2:SELF	6.432	630.746	0.688	1.143	-0.006	-9.576
	3:LIVE	2.196	222.391	0.771	1.166	-0.003	-3.319
	4:COMBINATIC	19.318	1.78E+3	2.366	4.110	-0.015	-28.730
	5:COMBINATIC	24.061	2.23E+3	3.148	5.399	-0.019	-35.803
	6:COMBINATIC	23.971	2.18E+3	2.234	4.122	-0.016	-35.575
96	1:DEAD	8.484	824.993	-0.033	0.409	0.003	-12.589
	2:SELF	7.647	567.906	-0.127	-0.063	-0.000	-11.392
	3:LIVE	3.180	162.995	-0.012	0.008	0.000	-4.786
	4:COMBINATIC	19.310	1.56E+3	-0.173	0[illegible]	0.002	-28.767
	5:COMBINATIC	24.445	1.93E+3	-0.213	0.428	0.003	-36.435
	6:COMBINATIC	22.583	1.95E+3	-0.225	0.484	0.003	-33.573
97	1:DEAD	7.545	790.055	5.618	9.081	-0.008	-11.192
	2:SELF	3.322	459.005	3.650	5.534	0.003	-4.991
	3:LIVE	1.538	89.014	1.406	2.110	-0.000	-2.357
	4:COMBINATIC	12.405	1.34E+3	10.674	16.724	-0.006	-18.540
	5:COMBINATIC	15.501	1.64E+3	13.611	20.913	-0.007	-23.191
	6:COMBINATIC	15.214	1.75E+3	13.255	20.461	-0.008	-22.656
98	1:DEAD	-13.703	567.487	3.850	6.153	0.040	20.355
	2:SELF	-6.700	302.973	2.283	3.516	0.010	9.881
	3:LIVE	-2.285	60.706	0.876	1.333	0.002	3.315
	4:COMBINATIC	-22.688	931.166	7.011	11.002	0.051	33.552
	5:COMBINATIC	-28.139	1.14E+3	8.765	13.736	0.062	41.588
	6:COMBINATIC	-28.564	1.22E+3	8.596	13.537	0.069	42.331
99	1:DEAD	-11.528	729.058	0.389	1.024	0.001	17.121

Reactions Cont...

		Horizontal	Vertical	Horizontal	Moment		
Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
	2:SELF	-10.518	464.711	0.156	0.364	-0.006	15.542
	3:LIVE	-4.307	124.198	0.043	0.095	-0.003	6.317
	4:COMBINATI(	-26.351	1.32E+3	0.588	1.483	-0.008	38.979
	5:COMBINATI(	-33.344	1.63E+3	0.723	1.817	-0.011	49.302
	6:COMBINATI(	-30.862	1.67E+3	0.763	1.944	-0.007	45.728
100	1:DEAD	-17.748	744.590	0.294	0.874	-0.001	26.304
	2:SELF	-10.294	468.654	0.141	0.332	-0.005	15.225
	3:LIVE	-4.150	121.208	-0.027	-0.013	0.003	6.093
	4:COMBINATI(	-32.191	1.33E+3	0.409	1.193	-0.009	47.621
	5:COMBINATI(	-40.290	1.65E+3	0.480	1.426	-0.012	59.582
	6:COMBINATI(	-39.258	1.7E+3	0.610	1.689	-0.008	58.140
101	1:DEAD	-11.089	694.701	0.855	1.655	0.016	16.415
	2:SELF	-10.242	466.807	-0.005	0.070	0.011	15.134
	3:LIVE	-4.144	121.034	0.052	0.081	0.003	6.089
	4:COMBINATI(	-25.476	1.28E+3	0.903	1.806	0.030	37.638
	5:COMBINATI(	-32.229	1.59E+3	1.104	2.200	0.037	47.602
	6:COMBINATI(	-29.864	1.63E+3	1.191	2.415	0.038	44.168
102	1:DEAD	-8.439	703.560	-0.330	-0.113	0.014	12.361
	2:SELF	-9.348	537.833	0.023	0.094	0.008	13.728
	3:LIVE	-3.202	127.060	-0.016	-0.031	0.002	4.668
	4:COMBINATI(	-20.988	1.37E+3	-0.323	-0.049	0.024	30.755
	5:COMBINATI(	-26.468	1.69E+3	-0.395	-0.071	0.030	38.773
	6:COMBINATI(	-24.901	1.74E+3	-0.430	-0.025	0.031	36.522
103	1:DEAD	-16.549	752.326	0.150	0.594	0.021	24.449
	2:SELF	-10.074	468.107	0.068	0.164	0.013	14.845
	3:LIVE	-4.064	121.778	-0.068	-0.105	0.004	5.958
	4:COMBINATI(	-30.687	1.34E+3	0.150	0.654	0.039	45.252
	5:COMBINATI(	-38.450	1.66E+3	0.152	0.742	0.048	56.685
	6:COMBINATI(	-37.273	1.71E+3	0.305	1.062	0.048	55.012
104	1:DEAD	-10.030	652.221	0.862	1.667	-0.001	14.710
	2:SELF	-9.607	464.398	-0.089	-0.070	0.005	14.100
	3:LIVE	-3.779	119.183	0.003	-0.003	0.000	5.523
	4:COMBINATI(	-23.416	1.24E+3	0.776	1.593	0.004	34.334
	5:COMBINATI(	-29.610	1.53E+3	0.933	1.910	0.005	43.410
	6:COMBINATI(	-27.491	1.56E+3	1.062	2.235	0.005	40.334
105	1:DEAD	-13.474	549.540	-3.317	-4.514	-0.046	19.841
	2:SELF	-6.465	297.211	-2.188	-3.178	-0.013	9.443
	3:LIVE	-2.195	59.310	-0.851	-1.269	-0.005	3.178
	4:COMBINATI(	-22.134	906.061	-6.356	-8.961	-0.065	32.461
	5:COMBINATI(	-27.438	1.11E+3	-7.988	-11.261	-0.080	40.225
	6:COMBINATI(	-27.915	1.19E+3	-7.708	-10.769	-0.084	40.996
106	1:DEAD	-0.488	364.866	0.151	0.690	-0.003	0.458
	2:SELF	-0.891	243.127	-0.097	-0.088	-0.004	1.117
	3:LIVE	-0.816	85.649	-0.212	-0.354	-0.001	1.105

Reactions Cont...

		Horizontal	Vertical	Horizontal	Moment		
Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
	4 COMBINATIC	-2.194	693.642	-0 159	0 247	-0 008	2 681
	5 COMBINATIC	-2 960	866.630	-0.276	0 155	-0 010	3 660
	6.COMBINATIC	-1.930	851.190	0 075	0.842	-0 009	2 206
107	1:DEAD	0 775	369 998	0.120	0.645	0.025	-1 265
	2:SELF	1 123	244.666	-0.040	0 067	0 016	-1 777
	3:LIVE	0 961	86.161	-0.171	-0 243	0.005	-1 498
	4:COMBINATIC	2.859	700.825	-0.092	0.469	0.046	-4 540
	5:COMBINATIC	3 815	875.454	-0 179	0.468	0 057	-6 047
	6 COMBINATIC	2.656	860.530	0 111	0 997	0.057	-4 259
108	1.DEAD	-11 744	987.001	2.672	5.699	-0 172	0 107
	2.SELF	-6 331	944.713	2.513	4 136	-0 130	-4 424
	3:LIVE	-3 772	321.175	3 630	5 361	-0 091	-2 063
	4.COMBINATIC	-21.847	2 25E+3	8.815	15.196	-0 393	-6.379
	5:COMBINATIC	-27 725	2.83E+3	12.030	20.379	-0 508	-8 481
	6:COMBINATIC	-25 304	2 7E+3	7.259	13 770	-0.423	-6 043
109	1:DEAD	2 007	89 749	-0 157	-0 347	0 013	0 080
	2.SELF	0.135	83 660	-0.815	-1.334	0.002	0 041
	3:LIVE	-2 775	27.895	-1.069	-1 645	-0 005	-0 192
	4.COMBINATIC	-0 632	201 303	-2.041	-3 327	0 010	-0.071
	5:COMBINATIC	-1.869	252 722	-2 877	[illegible]	0 009	-0 161
	6:COMBINATIC	3.000	242 772	-1.361	-2.354	0.021	0 170
110	1:DEAD	-4 758	83 041	-0.175	-0.409	-0 018	-0 794
	2 SELF	-2 757	80.246	-0.882	-1.447	-0.008	-0 703
	3 LIVE	0.623	26.477	-1 090	-1 675	-0.002	-0 205
	4 COMBINATIC	-6.890	189 764	-2.147	-3 531	-0 028	-1 701
	5 COMBINATIC	-8 019	238 307	-3.012	-4 906	-0 034	-2 124
	6:COMBINATIC	-10.518	228.602	-1.480	-2 598	-0 036	-2 096
111	1:DEAD	21.834	973 524	2 416	5 291	0 313	-42 633
	2:SELF	13.555	938.944	2 054	3 043	0 314	-29 122
	3:LIVE	8 033	318.618	3 302	4 541	0 254	-16 485
	4:COMBINATIC	43.422	2.23E+3	7.771	12.875	0.881	-88 239
	5:COMBINATIC	55.320	2.8E+3	10.646	17 266	1 159	-112 481
	6:COMBINATIC	49 544	2.68E+3	6 257	11 668	0.878	-100 456
112	1:DEAD	3 937	492.694	1.935	3 341	0 010	-6.007
	2:SELF	3.865	416.840	1.545	2 395	0.001	-5 899
	3:LIVE	2 617	202.568	1.607	2.408	-0 003	-3.989
	4:COMBINATIC	10.419	1 11E+3	5.067	8 143	0 007	-15 895
	5:COMBINATIC	13.549	1.42E+3	6 747	10.734	0 008	-20 869
	6:COMBINATIC	10 923	1 27E+3	4.872	8.031	0.015	-16 668
113	1:DEAD	-6 925	309 015	-1.636	-1 972	0 033	10 160
	2:SELF	-4.543	260 536	-0.653	-1 147	0 019	6.616
	3.LIVE	-0 831	41.969	-0.051	-0.046	0.002	1 139
	4:COMBINATIC	-12 299	611.520	-2.541	-3 165	0 055	17 935
	5 COMBINATIC	-15.091	750.612	-3.070	-3 817	0.067	21 977

Reactions Cont...

		Horizontal	Vertical	Horizontal	Moment		
Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
	6 COMBINATK	-16.055	797 371	-3.486	-4 367	0 073	23.514
114	1:DEAD	0.759	72.291	18.439	-6 484	-1 330	1 279
	2:SELF	0.283	83.941	22.989	-7 514	-1 616	1 706
	3 LIVE	-0 931	42.961	9 977	-4 435	-0 952	1.084
	4:COMBINATK	0 111	199 193	51.405	-18 433	-3.899	4.070
	5:COMBINATK	-0 240	256.216	65.677	-23 893	-5.059	5 317
	6:COMBINATK	1 459	218.724	58.000	-19.596	-4 125	4 180
115	1 DEAD	0.241	83 708	-19 315	6 268	-0.035	-0 154
	2 SELF	0.989	114 124	-25 293	8.623	-0 126	-0.499
	3 LIVE	0.814	74.351	-16 714	5.606	-0 090	-0 326
	4.COMBINATK	2.044	272.182	-61 322	20.497	-0 251	-0 980
	5:COMBINATK	2 778	356.359	-80 272	26.838	-0 337	-1 306
	6:COMBINATK	1 722	276.964	-62.451	20.847	-0 226	-0.915
116	1 DEAD	12.935	86.881	-0.275	-0 016	0.013	7.094
	2:SELF	11.526	77 619	-0 181	-0 015	0 008	6.297
	3 LIVE	2.416	14.621	-0.049	-0 011	0 004	1 149
	4 COMBINATK	26 876	179 121	-0.505	-0 042	0.024	14 539
	5 COMBINATK	33 218	220 793	-0.625	-0.055	0 030	17 907
	6 COMBINATK	34.245	230.299	-0.639	-0.044	0 026	18 747
117	1 DEAD	-8.623	201.447	1.583	2.251	-0 472	-1 556
	2 SELF	-10.665	215.058	0.873	0 960	-0 346	-1 113
	3.LIVE	-0.141	29.244	0.649	0 779	-0 164	-0.711
	[illegible]COMBINATK	-19.428	445 749	3 105	3 990	-0 983	-3 379
	5:COMBINATK	-23.371	546.596	3.985	5.099	1 245	-4 340
	6 COMBINATK	-27 002	583 107	3.439	4 495	-1 146	-3 736
118	1 DEAD	8 277	169.031	14.950	-7 295	-0.073	6 501
	2 SELF	8 127	151 187	12.885	-6 682	-0 044	5.685
	3:LIVE	1.665	27.128	2 666	-1.191	-0.005	0 931
	4 COMBINATK	18 070	347 346	30.502	-15 169	-0 122	13 117
	5 COMBINATK	22.350	427.666	37.669	-18 679	-0 148	16 113
	6 COMBINATK	22.966	446 305	38 970	-19.568	-0 164	17 060
119	1.DEAD	14.104	123 781	-12 953	6.895	-0 181	0 482
	2 SELF	13.587	126.266	-13 652	6.873	-0 157	0 608
	3.LIVE	3 337	24.447	-1.972	1 338	-0 049	0 028
	4:COMBINATK	31 028	274.493	-28 578	15 106	-0 [illegible]	1 116
	5 COMBINATK	38.568	339.171	-35.083	18 663	-0 484	1.353
	6:COMBINATK	38 767	350.066	-37.248	19.275	-0 473	1 527
120	1 DEAD	13.966	551.301	-3.169	-4 146	0 067	-21 132
	2 SELF	6.820	296.301	-2 143	-3 070	0.032	-10 429
	3 LIVE	2.391	59.732	[illegible]	-1.257	0 017	-3 729
	4:COMBINATK	23 177	909 335	-6.160	-8.473	0.117	-35.289
	5,COMBINATK	28.769	1 12E+3	-7 731	-10.671	0 147	-43.839
	6 COMBINATK	29 101	1 19E+3	-7.436	-10.102	0.139	-44 165
121	1.DEAD	-16.509	185 517	17 031	-7 699	-0 021	-6 470

Reactions Cont...

		Horizontal	Vertical	Horizontal	Moment		
Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
	2:SELF	-14.636	164.121	15.112	-6.919	-0.023	-5.678
	3:LIVE	-1.751	24.751	2.816	-1.017	0.009	-0.917
	4:COMBINATI(	-32.896	374.389	34.959	-15.636	-0.035	-13.064
	5:COMBINATI(	-40.176	459.167	43.078	-19.170	-0.038	-16.044
	6:COMBINATI(	-43.604	489.493	45.000	-20.466	-0.061	-17.006
122	1:DEAD	5.583	41.555	0.137	0.043	-0.012	2.101
	2:SELF	6.535	44.317	0.091	-0.003	-0.001	2.171
	3:LIVE	1.045	7.951	0.043	0.014	-0.004	0.397
	4:COMBINATI(	13.162	93.823	0.271	0.054	-0.017	4.668
	5:COMBINATI(	16.212	115.768	0.342	0.071	-0.021	5.761
	6:COMBINATI(	16.964	120.221	0.319	0.056	-0.017	5.981
123	1:DEAD	-16.716	133.971	-11.372	7.523	0.226	-0.486
	2:SELF	-15.922	132.759	-11.543	7.320	0.202	-0.564
	3:LIVE	-2.959	21.116	-1.349	1.160	0.042	-0.068
	4:COMBINATI(	-35.597	287.846	-24.264	16.023	0.470	-1.098
	5:COMBINATI(	-43.900	353.861	-29.657	19.699	0.581	-1.344
	6:COMBINATI(	-45.893	373.422	-32.081	20.780	0.600	-1.442
124	1:DEAD	7.901	609.645	-2.356	-3.035	-0.012	-11.873
	2:SELF	4.845	431.427	-1.527	-2.166	-0.015	-7.365
	3:LIVE	0.409	47.993	0.143	0.232	-0.005	-0.725
	4:COMBINATI(	13.156	1.09E+3	-3.741	-4.969	-0.031	-19.963
	5:COMBINATI(	15.951	1.33E+3	-4.432	-5.869	-0.040	-24.245
	6:COMBINATI(	17.845	1.46E+3	-5.437	-7.281	-0.037	-26.933
125	1:DEAD	-7.951	617.252	-2.353	-3.039	0.020	11.733
	2:SELF	-4.769	435.206	-1.477	-2.073	0.010	6.970
	3:LIVE	-0.256	49.142	0.165	0.272	0.001	0.292
	4:COMBINATI(	-12.976	1.1E+3	-3.665	-4.841	0.031	18.994
	5:COMBINATI(	-15.674	1.34E+3	-4.333	-5.700	0.037	22.910
	6:COMBINATI(	-17.808	1.47E+3	-5.362	-7.157	0.042	26.183
129	1:DEAD	-5.739	44.668	1.266	0.229	0.063	-1.682
	2:SELF	-7.752	44.539	0.766	-0.327	-0.104	-1.583
	3:LIVE	-5.475	19.495	0.344	-0.574	-0.176	-0.421
	4:COMBINATI(	-18.965	108.702	2.376	-0.672	-0.217	-3.886
	5:COMBINATI(	-24.948	138.241	2.989	-1.036	-0.331	-4.831
	6:COMBINATI(	-18.867	124.890	2.846	-0.137	-0.057	-4.851
130	1:DEAD	-13.193	107.646	-3.389	-2.108	0.209	3.181
	2:SELF	-10.581	99.134	-3.124	-2.776	0.132	2.870
	3:LIVE	-3.312	27.721	-2.539	-2.618	0.060	1.162
	4:COMBINATI(	-27.086	234.501	-9.051	-7.502	0.422	7.213
	5:COMBINATI(	-33.827	292.489	-11.877	-10.050	0.536	9.121
	6:COMBINATI(	-33.283	289.492	-9.117	-8.836	0.478	8.471
131	1:DEAD	12.890	111.117	-3.302	-1.989	-0.160	-3.059
	2:SELF	9.983	99.716	-3.069	-2.606	-0.094	-2.691
	3:LIVE	2.505	28.614	-2.550	-2.527	-0.047	-1.511

Reactions Cont...

		Horizontal	Vertical	Horizontal	Moment		
Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
	4 COMBINATIO	25.378	239.447	-8 940	-7 122	-0 302	-7 261
	5 COMBINATIO	31.455	298 782	-11 748	-9 557	-0 381	-9 317
	6 COMBINATIO	32.022	295 166	-8.947	-6 433	-0 356	-8.050
132	1 DEAD	-23 069	80.350	-2.487	-1 314	-0 388	-3 352
	2:SELF	-19 394	71.096	-2 028	-1.661	-0 461	-3 055
	3 LIVE	-4 522	17.467	-1 527	1.545	-0 421	-0 686
	4 COMBINATIO	-46.985	168 913	-8 042	-4 520	-1 271	-7 093
	5 COMBINATIO	-58 191	209 682	-7.861	-6.042	-1 693	8 786
	6 COMBINATIO	-59.448	212.024	-8 321	-4.166	-1 189	-8 969
133	1 DEAD	20 861	74.175	-2.271	-1 146	0.343	2 358
	2.SELF	16 967	64.099	-1 913	-1 453	0 417	2 134
	3 LIVE	2 961	14 338	-1 468	-1 393	0 394	0 355
	4 COMBINATIO	40 788	152 813	-5 651	-3.991	1 153	4 846
	5;COMBINATIO	50 130	188 871	-7.369	-5.347	1 541	5 957
	6 COMBINATIO	52.958	193.585	-5 857	-3 638	1 063	6.288
140	1 DEAD	-5.493	5.768	9 169	-0 690	0 264	-0 312
	2:SELF	-5 291	9.600	10 386	-2 369	0 300	1 065
	3 LIVE	-3 649	7 653	7.570	-2 354	0 160	-0 963
	4 COMBINATIO	-14 434	23 220	27 126	-5.414	0 724	-2 360
	5 COMBINATIO	-18 780	31 005	35 579	-7 439	0 933	-3 225
	6 COMBINATIO	-15.096	21 515	27.377	-4 283	0 789	-1 928
143	1 DEAD	1.423	11 684	13 968	-1 762	-0 924	1 375
	2 SELF	2.756	14.835	15 922	-3.051	-0 749	1 750
	3 LIVE	2 364	11 708	11.544	-2.870	-0 419	1 457
	4 COMBINATIO	6 543	38.226	41 434	-7 682	-2 092	4 582
	5 COMBINATIO	8 797	50 554	54 338	-10 367	-2 678	6 081
	6 COMBINATIO	5 851	37 126	41 846	[illegible]8 738	-2[illegible]42	4 375
150	1 DEAD	-2.118	850.087	-9 619	-13 596	0 155	-0 103
	2.SELF	-0 761	733 865	-7 659	-11.660	0 215	-1 250
	3 LIVE	-0 445	326.814	-7 180	-11 091	0 174	-0 655
	4 COMBINATIO	-3.324	1 91E+3	-24.457	-38 347	0 544	-2 008
	5 COMBINATIO	-4 167	2 42E+3	-32 221	-48 052	0.722	-2 672
	6 COMBINATIO	-4 032	2.22E+3	-24 189	-35 358	0 518	-1 894
164	1.DEAD	52.493	370.109	[illegible]	22.716	-0 630	7 266
	2;SELF	27.560	261.554	-22 279	14.790	-0.367	6 071
	3 LIVE	6 675	75.248	-6.048	3.933	-0 206	1 852
	4;COMBINATIO	86 727	706 911	-58.277	41.440	-1.203	15 189
	5;COMBINATIO	106 742	878 392	-72.351	51 301	-1 528	18 967
	6 COMBINATIO	112 074	884 328	-73 121	52.509	-1 396	18 671
165	1,DEAD	-52 840	352 158	-32.093	21 582	0.671	-6 312
	2 SELF	-24 072	242 575	-24.807	14 192	0 379	-5 120
	3 LIVE	-3.418	81 073	-7 966	3 376	0.216	-1 130
	4 COMBINATIO	-80 431	655 805	-64 866	39 150	1 268	-12 562
	5,COMBINATIO	-97 884	811 395	-81 025	48 331	1 606	-15 527

Reactions Cont...

		Horizontal	Vertical	Horizontal	Moment		
Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
	6:COMBINATIC	-107.818	832.626	-79.660	50.084	1 470	-16 006
166	1 DEAD	0,895	149.505	15 924	-24.389	1 033	-2 997
	2:SELF	0,533	82,885	5,393	-15 785	0 378	-1.840
	3:LIVE	1 618	-9.788	-9 530	-4.201	0 180	-0 656
	4:COMBINATIC	3 046	222.602	11 788	-44 375	1 591	-5.492
	5:COMBINATIC	4,303	263 208	10,334	-54 931	1 982	-6 852
	6:COMBINATIC	1,999	325 347	29.845	-56.244	1 975	-6 771
167	1 DEAD	0,517	146 593	13.202	-24 411	-0 380	1 643
	2:SELF	1 337	68,844	7,768	-15 182	0 184	0 341
	3:LIVE	-0,275	-5 394	-7.608	-3 718	0 198	-0 416
	4:COMBINATIC	1.579	230.044	13.362	-43.312	0 001	1 568
	5:COMBINATIC	1,785	273 695	12.992	-53 461	0 081	1 715
	6:COMBINATIC	2,596	329.612	29 358	-55.431	-0.275	2 778
168	1:DEAD	48.830	131,496	-10 782	-2.767	0 897	10 955
	2:SELF	23 948	90 843	-7.162	-2.560	0 928	7 701
	3:LIVE	1,828	13 606	-2 722	-1 958	0 583	2.309
	4:COMBINATIC	74.606	235 947	-20 666	-7.285	2 409	20 966
	5:COMBINATIC	90 258	288 579	-25.887	-9 525	3 124	26.082
	6:COMBINATIC	101 889	311.275	-25,122	-7 457	2.556	26 119
169	1.DEAD	-40.619	106,246	-10 776	-3 460	-1 277	-10 808
	2:SELF	-18 167	66.033	-6 848	-2.655	-1 178	-7 842
	3:LIVE	1,512	-1.297	-2,622	-2.020	-0 773	-2 455
	4:COMBINATIC	-57 294	172 982	-20,245	-8 135	-3 228	-21 105
	5.COMBINATIC	-68,148	207.060	-25 343	-10.569	-4 183	-26.308
	6:COMBINATIC	-82,328	243.990	-24 673	-8.560	3.437	-26 110
176	1.DEAD	4,764	876.771	-10,450	-14.735	-0 047	-9 131
	2:SELF	2,316	740.590	-7 611	-11.152	0 061	-5 129
	3:LIVE	1.317	324,083	-6 987	-10.440	0 048	-2 799
	4:COMBINATIC	8.396	1 94E+3	-25.049	-36.327	0 062	-17.059
	5:COMBINATIC	10,602	2.46E+3	-32 854	-47 768	0 093	-21 590
	6:COMBINATIC	9.911	2 26E+3	-25.286	-36.242	0 019	19 964
243	1:DEAD	6,366	75.198	-2.204	-0 514	-0.095	0 433
	2:SELF	5,497	78.073	-2,225	-0.586	-0 103	0 460
	3:LIVE	1.886	14 549	-0 364	-0 083	-0.010	0 058
	4:COMBINATIC	13,749	187 819	-4 794	-1 183	-0 208	0 951
	5:COMBINATIC	17,253	207.203	-5.899	-1.453	-0.254	1 165
	6:COMBINATIC	16,608	214 579	-6.202	-1.539	-0 276	1.250
244	1:DEAD	-8.234	83 311	-1.898	-0.447	0 082	-0 579
	2:SELF	-7.435	84.073	-1.864	-0.490	0 083	-0 589
	3:LIVE	-1,631	13 780	-0 260	-0.059	0 008	-0.116
	4:COMBINATIC	-17.300	181.164	-4.023	-0 996	0 173	-1.285
	5:COMBINATIC	-21 412	222 909	-4 931	-1 219	0.211	-1 588
	6:COMBINATIC	-21.936	234 337	-5.267	-1 312	0.232	-1.636
245	1.DEAD	-3.486	82.531	-0 177	-0.047	0 002	-0.061



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Reactions Cont...

		Horizontal	Vertical	Horizontal	Moment		
Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
	2 SELF	-2.529	84 734	-0 192	-0 115	0 003	-0 062
	3 LIVE	-0.751	14,854	-0.035	-0 004	0 000	-0.042
	4 COMBINATI(	-6,766	182 119	-0.404	-0 166	0.005	-0.165
	5 COMBINATI(	-8,419	224 485	-0.499	-0.200	0 006	-0 215
	6 COMBINATI(	-8 421	234.171	-0 517	-0.227	0 007	-0 172
246	1 DEAD	3 682	72.583	-0.163	0.019	0 009	-0 061
	2 SELF	2,525	75,989	-0 184	-0.080	0 005	-0 058
	3 LIVE	1 510	12,532	-0.042	0 019	0 004	-0 036
	4,COMBINATI(	7.717	161,104	-0 409	-0.042	0 017	-0 155
	5 COMBINATI(	9,664	196.337	-0 506	-0.043	0.022	-0 200
	6 COMBINATI(	8.689	206,000	-0,514	-0 086	0 019	-0 167
447	1 DEAD	-7,467	788.780	5 794	9 089	0 016	10.908
	2 SELF	-3,153	458 767	3 611	5 456	-0 007	4 458
	3 LIVE	-1.350	89 010	1 394	2 075	-0 005	1 865
	4 COMBINATI(	-11 990	1 34E+3	10.799	16 620	0 005	17 231
	5 COMBINATI(	-14 928	1,64E+3	13 516	20 774	0.003	21 424
	6 COMBINATI(	-14.896	1 75E+3	13 167	20 363	0 014	21.512
740	1 DEAD	6.830	286 009	2 116	-2.676	-0 021	-10 264
	2 SELF	4.522	239 755	-1 347	-1 897	-0 023	-6.860
	3 LIVE	0 928	35.199	-0.208	-0 286	-0 007	-1 484
	4 COMBINATI(	12,280	560 964	-3 671	-4.858	-0 050	-18.608
	5 COMBINATI(	15 107	687,236	-4.489	-5 944	-0 063	-22.923
	6 COMBINATI(	15,892	736.070	-4.848	-6.401	-0.061	-23 974
1295	1 DEAD	-2 975	7,144	5.513	-1.062	0.259	-0.653
	2 SELF	-4,367	11.295	5 914	-2.534	0.065	-1 120
	3 LIVE	-4 276	12.594	8 049	-2.244	0 280	-1 195
	4 COMBINATI(	-11,617	31,033	19 475	-5.839	0 604	-2.969
	5 COMBINATI(	-15,651	42 277	26 590	-7 904	0 836	-4 041
	6 COMBINATI(	-10.278	25 815	15 997	-5.034	0.454	-2.483
6558	1 DEAD	1,315	70 152	0 092	0 168	0.001	-0.041
	2 SELF	0,310	73 918	0 012	0.034	0.003	-0 023
	3 LIVE	0,986	11 233	0.047	0.063	-0 001	-0 040
	4 COMBINATI(	2,611	155.303	0 151	0 265	0 003	-0 104
	5.COMBINATI(	3,528	190.857	0.200	0 343	0.003	-0 141
	6 COMBINATI(	2 275	201,696	0 145	0 282	0 006	0.090
6565	1 DEAD	5 728	75,655	-0 661	-0 178	-0.023	-0 113
	2 SELF	4 584	76 916	-0 646	-0 257	-0 028	-0 112
	3 LIVE	1.896	13,869	-0 137	-0.026	-0.002	-0 045
	4.COMBINATI(	12,206	166.440	-1.445	-0.461	-0 053	-0 270
	5 COMBINATI(	15,406	207 676	-1 768	-0 563	-0.064	-0 343
	6 COMBINATI(	14.437	216.400	-1 830	-0.608	-0.071	-0 315
6697	1 DEAD	0.996	157,281	3.616	0 697	-0 103	-0 489
	2 SELF	0 931	146.757	2,451	0.229	-0 106	-0.464
	3.LIVE	0.247	26.439	1 118	0.044	-0 021	-0 161

Reactions Cont...

		Horizontal	Vertical	Horizontal	Moment		
Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
	4:COMBINATIC	2.175	330.477	7.186	0.970	-0.230	-1.114
	5:COMBINATIC	2.709	407.148	9.070	1.182	-0.284	-1.401
	6:COMBINATIC	2.700	425.653	8.495	1.296	-0.293	-1.334
6698	1:DEAD	2.323	150.616	-3.120	0.155	0.302	-0.939
	2:SELF	2.151	148.214	-3.947	-0.292	0.290	-0.857
	3:LIVE	0.556	27.430	0.362	-0.099	0.071	-0.267
	4:COMBINATIC	5.030	328.258	-6.705	-0.237	0.662	-2.063
	5:COMBINATIC	6.259	[illegible]	-7.901	-0.323	0.823	-2.583
	6:COMBINATIC	6.263	418.362	-9.894	-0.193	0.828	-2.515
6787	1:DEAD	-7.006	85.316	-0.603	-0.188	0.030	-0.016
	2:SELF	-6.001	86.827	-0.591	-0.241	0.031	-0.013
	3:LIVE	-1.417	14.727	-0.105	-0.028	0.004	-0.031
	4:COMBINATIC	-14.424	186.869	-1.299	-0.456	0.064	-0.061
	5:COMBINATIC	-17.675	230.133	-1.601	-0.559	0.079	-0.085
	6:COMBINATIC	-18.210	240.999	-1.671	-0.600	0.085	-0.041
6801	1:DEAD	1.329	78.917	0.084	0.049	0.007	0.024
	2:SELF	2.077	82.225	0.018	-0.037	0.008	-0.002
	3:LIVE	0.180	14.797	0.032	0.019	0.002	-0.028
	4:COMBINATIC	3.587	175.939	0.134	0.030	0.017	-0.007
	5:COMBINATIC	4.377	217.045	0.174	0.044	0.022	-0.019
	6:COMBINATIC	4.769	225.599	0.142	0.016	0.022	0.030
7073	1:DEAD	-2.061	167.240	5.769	0.829	0.282	0.939
	2:SELF	-1.791	153.486	5.235	0.378	0.248	0.812
	3:LIVE	-0.236	23.282	1.722	0.043	0.029	0.096
	4:COMBINATIC	-4.088	344.008	12.726	1.251	0.580	1.848
	5:COMBINATIC	-5.000	422.123	15.960	1.518	0.683	2.256
	6:COMBINATIC	-5.393	449.017	15.405	1.690	0.742	2.452
7074	1:DEAD	-2.507	160.733	0.817	0.014	-0.360	1.121
	2:SELF	-2.325	154.585	0.422	-0.365	-0.342	1.005
	3:LIVE	-0.439	24.016	0.953	-0.067	-0.065	0.171
	4:COMBINATIC	-5.271	339.334	2.192	-0.418	-0.768	2.297
	5:COMBINATIC	-6.501	416.808	3.011	-0.528	-0.947	2.824
	6:COMBINATIC	-6.765	441.446	1.734	-0.492	-0.984	2.976
7081	1:DEAD	3.618	158.583	-0.061	0.128	-0.040	-0.038
	2:SELF	3.028	141.351	-0.025	0.089	-0.030	-0.107
	3:LIVE	1.066	24.597	-0.032	0.003	-0.005	-0.125
	4:COMBINATIC	7.711	324.532	-0.118	0.220	-0.076	-0.270
	5:COMBINATIC	9.680	399.277	-0.154	0.266	-0.093	-0.374
	6:COMBINATIC	9.303	419.909	-0.121	0.304	-0.098	-0.203
7085	1:DEAD	-4.167	160.986	1.998	0.706	-0.271	0.336
	2:SELF	-3.889	142.403	1.727	0.572	-0.237	0.235
	3:LIVE	0.100	22.754	0.305	0.101	-0.046	-0.049
	4:COMBINATIC	-7.956	326.143	4.030	1.379	-0.554	0.522
	5:COMBINATIC	-9.507	400.474	4.958	1.695	-0.683	0.607

Reactions Cont...

		Horizontal	Vertical	Horizontal	Moment		
Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
	6 COMBINATIC	-11 278	424,745	5.215	1 769	-0 711	0 799
7106	1 DEAD	16.048	187 524	-0.806	-0 182	0.061	-5 183
	2 SELF	14 551	163,826	-0.562	-0 169	0.040	-4 546
	3 LIVE	2 066	22,944	-0 154	-0.052	0.010	-0 728
	4 COMBINATIC	32.665	374.293	-1 522	-0 402	0.111	-10.456
	5 COMBINATIC	[illegible]	458 329	-1,888	-0.504	0 137	-12 637
	6 COMBINATIC	42.838	491 889	-1 915	-0 491	0 141	-13 621
7107	1 DEAD	-3 968	164.216	1 506	0 424	0 284	-0 003
	2 SELF	-2 347	144 895	1,272	0 309	0 237	-0 041
	3 LIVE	-0 187	23.010	0.250	0.059	0.050	-0 140
	4 COMBINATIC	-6.503	332.121	3.028	0 792	0 571	-0 184
	5 COMBINATIC	-7 879	407 749	3 734	0 974	0 705	-0 277
	6 COMBINATIC	-8,842	432 755	3.890	1 026	0 729	-0.062
7315	1 DEAD	0.249	132,663	-17 806	-1 270	0.028	-0.263
	2 SELF	1 302	160 187	-20,160	-1 714	0.080	-0 929
	3 LIVE	0 985	113.674	-13.349	-1 170	0 062	-0 586
	4 COMBINATIC	2.537	426.523	-51,318	-4 154	0 170	-1 778
	5 COMBINATIC	3 438	557,297	-66.921	-5.452	0 229	-2 367
	6 COMBINATIC	2 172	437,989	-53 156	-4 177	0 151	-1 668
7320	1 DEAD	0 108	124 442	-16.028	-0 769	0 020	-0 165
	2 SELF	1,320	163 211	-16 973	-1.162	0 056	-0 638
	3 LIVE	0,995	99 679	-11,780	-0.837	0.045	-0 340
	4 COMBINATIC	2.423	387 331	-44,782	-2.768	0 121	-1 143
	5 COMBINATIC	3 305	504 669	-58 450	-3.657	0 163	-1 507
	6 COMBINATIC	1.999	402 714	-46.202	-2 703	0 106	-1 124
7321	1 DEAD	-0.097	119 442	-14.542	-1 503	-0.016	-0 091
	2 SELF	0.829	150 094	-14 773	-1 923	0.118	-0 400
	3 LIVE	0.619	88,300	-10 600	-1.290	0 087	-0 131
	4 COMBINATIC	1 351	357 835	-39 915	-4 716	0 169	-0.622
	5 COMBINATIC	1.868	464 723	-52,137	-6 175	0 262	-0 798
	6 COMBINATIC	1 025	377 349	-41 041	-4 796	0 143	-0 687
7322	1 DEAD	-0.446	120.034	-2.621	-0.743	-0 037	-0.111
	2 SELF	0.621	142 745	-0.913	-1 086	0 087	-0.039
	3 LIVE	0,235	80.319	-1.869	-0.804	0.064	0 180
	4 COMBINATIC	0.410	343 096	-5.403	-2.634	0.113	0 030
	5 COMBINATIC	0.566	443 846	-7.231	3.482	0.162	0 108
	6 COMBINATIC	0.245	367 891	-4.948	-2.561	0.069	-0 210
7422	1 DEAD	-4 326	21 654	20,855	-1 578	0 179	-0 631
	2 SELF	-6.286	27,879	25.940	-2 594	0 241	-0 765
	3 LIVE	-4 734	17.689	16,291	-1 936	-0.096	-0.257
	4 COMBINATIC	-15 346	67.423	63.066	-6 107	0 324	-1 673
	5 COMBINATIC	-20.308	68.063	82.220	-8 103	0 350	-2 111
	6 COMBINATIC	-14.855	69,347	65.514	-5.840	0 587	-1 982
7423	1 DEAD	-3 745	14.236	13,267	-1 709	0.236	-0 095

Reactions Cont...

		Horizontal	Vertical	Horizontal	Moment		
Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
	2:SELF	-5.552	20.371	15.389	-3.861	0.389	-0.065
	3:LIVE	-4.355	18.526	14.071	-3.345	0.001	0.223
	4:COMBINATIC	-13.652	53.133	42.727	-8.915	0.627	0.043
	5:COMBINATIC	-18.125	71.171	56.901	-12.036	0.752	0.141
	6:COMBINATIC	-13.016	46.450	40.118	-7.798	0.875	-0.252
7595	1:DEAD	-5.050	11.737	16.383	-1.809	1.427	-0.564
	2:SELF	-4.303	16.602	19.214	-4.921	1.412	-0.629
	3:LIVE	-2.881	15.309	14.167	-4.636	0.934	-0.400
	4:COMBINATIC	-12.234	45.647	49.764	-11.566	3.772	-1.593
	5:COMBINATIC	-15.833	60.901	65.383	-15.813	4.900	-2.072
	6:COMBINATIC	-13.094	42.474	49.836	-9.422	3.974	-1.671
7599	1:DEAD	-1.023	19.878	24.499	-3.034	2.120	-1.091
	2:SELF	-0.543	25.690	27.463	-5.692	2.006	-1.113
	3:LIVE	-0.151	20.248	19.740	-5.428	1.352	-0.743
	4:COMBINATIC	1.717	65.816	71.701	-14.154	5.478	-2.947
	5:COMBINATIC	-2.121	87.078	93.938	-19.155	7.115	-3.834
	6:COMBINATIC	-2.192	63.795	72.746	-12.217	5.776	-3.086
7724	1:DEAD	-10.565	84.360	-1.064	-1.035	-0.035	0.166
	2:SELF	-7.823	79.881	-1.524	-1.875	-0.024	0.167
	3:LIVE	-1.743	24.504	-1.524	-1.949	-0.015	0.256
	4:COMBINATIC	-20.131	188.745	-4.112	-4.858	-0.074	0.589
	5:COMBINATIC	-24.854	236.296	-5.544	-6.610	-0.094	0.809
	6:COMBINATIC	-25.743	229.938	-3.823	-4.074	-0.082	0.466
7737	1:DEAD	8.735	95.256	-1.096	-1.035	0.027	-0.901
	2:SELF	5.869	87.398	-1.528	-1.863	0.021	-0.821
	3:LIVE	0.008	27.293	-1.564	-2.014	0.015	-0.761
	4:COMBINATIC	14.612	209.948	-4.188	-4.911	0.063	-2.483
	5:COMBINATIC	17.538	262.855	-5.651	-6.699	0.082	-3.284
	6:COMBINATIC	20.446	255.717	-3.674	-4.056	0.067	-2.410
7746	1:DEAD	-10.245	83.590	1.657	0.386	-0.113	1.197
	2:SELF	-10.145	79.759	0.740	-0.686	-0.119	1.111
	3:LIVE	-6.143	29.268	0.046	-1.165	-0.102	0.433
	4:COMBINATIC	-26.533	192.616	2.446	-1.466	-0.333	2.741
	5:COMBINATIC	-34.297	242.847	2.954	-2.225	-0.441	3.463
	6:COMBINATIC	-28.546	228.688	3.356	-0.421	-0.324	3.232
7755	1:DEAD	2.233	40.120	1.282	0.192	-0.052	2.086
	2:SELF	4.959	42.252	0.691	-0.418	0.130	1.840
	3:LIVE	3.266	17.290	0.276	-0.630	0.193	0.588
	4:COMBINATIC	10.458	99.661	2.229	-0.856	0.271	4.514
	5:COMBINATIC	13.855	126.509	2.785	-1.279	0.402	5.652
	6:COMBINATIC	10.068	115.320	2.734	-0.316	0.110	5.496
7756	1:DEAD	6.553	79.776	1.832	0.313	0.117	-1.125
	2:SELF	6.904	79.366	0.590	-0.865	0.121	-1.080
	3:LIVE	3.697	28.623	-0.069	1.273	0.100	-0.453



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Job No	Sheet No 23	Rev
Part		
Ref		
By yasir w.j	Date 05-Dec-10	Chd Dr alaa k
File design2 std	Date/Time 10-May-2011 09:36	

Job Title bluiding department

Client university of tecnology

Reactions Cont...

		Horizontal	Vertical	Horizontal	Moment		
Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
	4:COMBINATIC	17.154	187 765	2 154	-1 826	0 337	-2 658
	5:COMBINATIC	22.064	236 787	2 557	-2 700	0 444	-3 370
	6:COMBINATIC	18 840	222 799	3 111	-0 774	0 332	-3 086
7922	1 DEAD	-9.086	707 031	-0 212	0 102	0 006	13 490
	2.SELF	-10 116	529.669	0.068	0 202	0.002	14 964
	3:LIVE	-3.596	122.673	0.006	0 026	-0 001	5 282
	4:COMBINATIC	-22 800	1 36E+3	-0 138	0 331	0 008	33 736
	5:COMBINATIC	-28 799	1.68E+3	-0 163	0 407	0 009	42 596
	6 COMBINATIC	-26.882	1 73E+3	-0.202	0 427	0 012	39 636
9200	1:DEAD	-3 828	509.043	1 314	2 410	0.005	5.605
	2 SELF	-3 991	433 326	1.017	1 630	0 000	5 818
	3:LIVE	-2 591	206.929	1 456	2 166	0 001	3 754
	4 COMBINATIC	-10.410	1 15E+3	3 786	6.226	0 006	15 177
	5:COMBINATIC	-13 528	1 46E+3	5 126	8 346	0 008	19 714
	6:COMBINATIC	-10.946	1 32E+3	3.263	5 656	0 007	15 992
9201	1:DEAD	-0.860	416 865	0.800	1 661	-0 004	0 993
	2:SELF	-0 884	272.562	0 362	0.613	-0 006	1 060
	3:LIVE	-0 788	101 749	0 195	0 271	-0 004	1 053
	4 COMBINATIC	-2 512	791 177	1 358	2 545	-0.014	3 106
	5:COMBINATIC	-3 329	990 112	1 707	3 162	-0 019	4 148
	6 COMBINATIC	-2.414	965 198	1.628	3 184	-0 014	2.873
9202	1.DEAD	1.063	424 129	0 906	1 817	0 025	-1 614
	2:SELF	1.052	275 413	0.523	0 907	0 015	-1 621
	3:LIVE	0 929	102 534	0.297	0 457	0 004	-1 435
	4:COMBINATIC	3 044	802 075	1 726	3 182	0 045	-4 671
	5:COMBINATIC	4 025	1E+3	2 190	4 001	0 056	-6 179
	6:COMBINATIC	2 961	979.358	2.000	3 614	0 057	-4 530



2251 2100X 300X 600 42

5No12 H 543. 69 .TO 2100

3*12c/c2

5No12 H 57. 0.TO 1378

		00000	00000	00000	00000
		5#12	5#12	5#12	5#12
5#12	5#12	5#12	5#12		
00000	00000	00000	00000		

BEAM NO. 120 DESIGN RESULTS FLEXURE PER CODE ACI 318-05

LEN 4200 MM FY - 414. FC - 28. MPA, SIZE - 300 X 600 MMS

LEVEL	HEIGHT (MM)	BAR INFO		FROM (MM)	TO (MM)	ANCHOR STA	ANCHOR END
1	57	5	12MM	543	3828	NO	NO
2	543	5	12MM	0	1144	YES	NO
3	543.	5	12MM	2881	4200.	NO	YES

B E A M N O. 120 D E S I G N R E S U L T S - SHEAR

AT START SUPPORT - Vu= 70.43 KNS Vc= 150 68 KNS Vs 0.00 KNS
Tu= 0.14 KN-MET Tc= 6.1 KN MET Ts= 0.0 KN-MET LOAD 2
NO STIRRUPS ARE REQUIRED FOR TORSION.
REINFORCEMENT FOR SHEAR IS PER CL 11 5.5 1
PROVIDE 12 MM 2 LEGGED STIRRUPS AT 272 MM C/C FOR 1563. MM

AT END SUPPORT - Vu 42 08 KNS Vc 193.16 KNS Vs= 0.00 KNS
Tu= 0.10 KN MET Tc 6.0 KN MET Ts= 0 0 KN-MET LOAD
STIRRUPS ARE NOT REQUIRED.

```
 42T                4199X 300X  600                 43T

5No12 H 543.   0.TO 1144                   5No12 H 543 288..TO 4200
 7*12 c/c272
      5No12 H  57  547 TO 3828

| 00000 |   | 00000                               | 00000 |         00000
 5#12         5#12                                  5#12            5#.2

              5#12         5#12        5#12        5#12
              00000        00000       00000       00000
```

BEAM NO. 121 DESIGN RESULTS - FLEXURE PER CODE ACI 318-05

LEN - 4200. MM FY - 414. FC - 28. MPA, SIZE - 300. X 600. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA	ANCHOR END
1	57.	5 - 12MM	547	3428.	NO	NO
2	543.	5 - 12MM	0.	1144	YES	NO
3	543	5 12MM	2? 1.	4200	NO	YES

B E A M N O 121 D E S I G N R E S U L T S - SHEAR

```
AT START SUPPORT  Vu    65.66 KNS  Vc= 153.69 KNS  Vs    0.00 KNS
Tu=    0.19 KN MET  Tc=    6.0 KN MET  Ts=   0.0 KN MET  LOAD    ?
NO STIRRUPS ARE REQUIRED FOR TORSION.
REINFORCEMENT FOR SHEAR IS PER CL 11.5 5.1
PROVIDE 12 MM 2 LEGGED STIRRUPS AT 272. MM  C/C FOR 1564. MM

AT END  SUPPORT   Vu=   6?.68 KNS  Vc   15? 84 KNS  Vs=    0.00 KNS
Tu=    0 19 KN MET  Tc=    6.? KN MET  Ts=    0.0 KN-MET  LOAD    ?
NO STIRRUPS ARE REQUIRED FOR TORSION.
REINFORCEMENT FOR SHEAR IS PER CL 11.5 5.1.
PROVIDE 12 MM 2 LEGGED STIRRUPS AT 272  MM  C/C FOR 1564. MM
```

```
    43                       4200X 300X  600                  442

5No12 H 543.   0.TO 1144                    5No12 H 543 2031.TO 4200
 7*12c/c272                                                7*12c/c272
          5No12 H  57  547.TO 3478

 OOOOO       OOOOO                                  OOOOO         OOOOO
 5#12        5#12                                   5#12          5#12

             5#12         5#12       5#12           5#12
             OOOOO        OOOOO      OOOOO          OOOOO
```

```
====================================================================

      BEAM  NO    122 DESIGN RESULTS - FLEXURE PER CODE ACI 318-05

LEN - 4200. MM  FY - 414.  FC - 28.  MPA, SIZE - 300  X  600  MMS

LEVEL    HEIGHT     BAR INFO      FROM       TO         ANCHOR
          (MM)                    (MM)      (MM)       STA  END
____________________________________________________________________

  1        57      5 - 12MM       47.       3478.      NO   NO
  2       543.     5 - 12MM        0        1144       YES  NO
  3       543.     5 - 12MM      2088.      4200       NO   YES


      B E A M  N O.  122 D E S I G N  R E S U L T S   SHEAR

 AT START SUPPORT   Vu=   62.20 KNS  Vc   141 48 KNS  Vs     0.00 KNS
 Tu       3 17 KN-MET  Tc -    5.9 KN MET  Ts=    0.0 KN-MET  LOAD    1
 NO STIRRUPS ARE REQUIRED FOR TORSION.
 REINFORCEMENT FOR SHEAR IS PER CL.11 5 5 1.
 PROVIDE 12 MM 2-LEGGED STIRRUPS AT 272. MM  C C FOR 1563. MM

 AT END   SUPPORT - Vu=   58.52 KNS  Vc=  141.48 KNS  Vs     0 00 KNS
 Tu=      3 17 KN MET  Tc=     5 9 KN-MET  Ts     0.0 KN-MET  LOAD    1
 NO STIRRUPS ARE REQUIRED FOR TORSION
 REINFORCEMENT FOR SHEAR IS PER CL 11 5.5.1
 PROVIDE 12 MM 2-LEGGED STIRRUPS AT 272. MM  C/C FOR 1563. MM
```

```
   21J                    4199X 300X  600                         22J
=================                                 =========== === ===== ==
5No12 H 543    0.TO 1144                          5No12 H 543 2881 TO 4200
 7*12c/c272                                                  7*12c/c272
        5No12 H  57. 547 TO 3478
       ====  =====  ==    ====  === ======  ==    ==== ====

00000          00000                                    00000          0000
5#12           5#12                                     5#12           5#12

               5#12          5#12          5#12         5#12
              | 00000       | 00000        00000       | 00000 |
```

BEAM NO. 123 DESIGN RESULTS - FLEXURE PER CODE ACI 318-05

LEN - 4200 MM FY - 414 FC 28 MPA, SIZE - 300. X 600. MMS

LEVEL	HEIGHT (MM)	BAR INFO		FROM (MM)	TO (MM)	ANCHOR STA	ANCHOR END
1	57.	5	12MM	547.	3478.	NO	NO
2	543.	5	12MM	0.	1144	YES	NO
3	543	5	12MM	2881.	4200	NO	YES

B E A M N O. 123 D E S I G N R E S U L T S - SHEAR

```
AT START SUPPORT   Vu=    60.12 KNS  Vc    141 94 KNS  Vs=     0.00 KNS
Tu      2.32 KN MET  Tc       5.9 KN-MET  Ts=     0 0 KN MET  LOAD     1
NO STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT FOR SHEAR IS PER CL.11.5.5.1
PROVIDE 12 MM 2 LEGGED STIRRUPS AT 272  MM  C C FOR 1563  MM

AT END   SUPPORT   Vu     60 60 KNS  Vc=  141 94 KNS  Vs=     0.00 KNS
Tu=     2.32 KN-MET  Tc       5 9 KN MET  Ts=     0 0 KN-MET  LOAD     1
NO STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT FOR SHEAR IS PER CL 11 5 5.1
PROVIDE 12 MM 2 LEGGED STIRRUPS AT 272  MM  C/C FOR 1563. MM
```

```
  22.  4199X 300X 600  230

 5No.2 H 543.   0.TO 1144                    5No12 H 543 2881.TO 4200
 7*12c/c272                                              7*12c/c272
        5No12 H  57  547.TO 3478

 00000        00000                                 00000        00000
 5#12         5#12                                  5#12         5#12

              5#12         5#12         5#12        5#12
              00000        00000        00000       00000
```

BEAM NO. 124 DESIGN RESULTS - FLEXURE PER CODE ACI 318-05

LEN 4200 MM FY = 414 FC = 28 MPA, SIZE = 300 X 600. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA	ANCHOR END
1	57.	5 - 12MM	547	3478	NO	NO
2	543	5 12MM	0.	1144.	YES	NO
3	543.	5 - 12MM	2881	4200	NO	YES

B E A M N O. 124 D E S I G N R E S U L T S - SHEAR

AT START SUPPORT Vu= 63.16 KNS Vc= 141 92 KNS Vs= 0 00 KNS
Tu= 0 07 KN MET Tc= 5.9 KN-MET Ts= 0 0 KN MET LOAD 1
NO STIRRUPS ARE REQUIRED FOR TORSION.
REINFORCEMENT FOR SHEAR IS PER CL 11 5 5.1.
PROVIDE 12 MM 2-LEGGED STIRRUPS AT 272 MM C/C FOR 1564 MM

AT END SUPPORT Vu= 57.55 KNS Vc= 141 92 KNS Vs= 0.00 KNS
Tu= 0.07 KN MET Tc 5 9 KN MET Ts= 0.0 KN-MET LOAD 1
NO STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT FOR SHEAR IS PER CL.11 5.5.1
PROVIDE 12 MM 2 LEGGED STIRRUPS AT 272 MM C/C FOR 1564. MM

```
   23J                          4200X 300X  600                       241

5No12 H 543    0.TO 1144                        5No12 H 543 2881 TO 4200
7*12c/c272                                                 7*12c/c272
       5No12 H| 57. 547.TO 3478

00000      00000                                  00000      00000
5#12       5#12                                   5#12       5#12

           5#12        5#12        5#12           5#12
           00000       00000       00000          00000
```

BEAM NO. 125 DESIGN RESULTS - FLEXURE PER CODE ACI 318-05

LEN - 4200. MM FY - 414 FC - 28 MPA, SIZE - 300. X 600. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA	ANCHOR END
1	57.	5 - 12MM	547	3478.	NO	NO
2	543.	5 - 12MM	0.	1144.	YES	NO
3	543.	5 - 12MM	2531	4200	NO	YES

B E A M N O 125 D E S I G N R E S U L T S - SHEAR

AT START SUPPORT Vu= 58.90 KNS Vc 141.80 KNS Vs 0.00 KNS
Tu 2.66 KN MET Tc= 5 9 KN MET Ts= 0.0 KN-MET LOAD 1
NO STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT FOR SHEAR IS PER CL.11 5.5.1
PROVIDE 12 MM 2 LEGGED STIRRUPS AT 272 MM C/C FOR 1564. MM

AT END SUPPORT Vu= 64 93 KNS Vc 141.80 KNS Vs 0.00 KNS
Tu= 2 66 KN-MET Tc= 5.9 KN MET Ts= 0.0 KN-MET LOAD 1
NO STIRRUPS ARE REQUIRED FOR TORSION.
REINFORCEMENT FOR SHEAR IS PER CL.11.5.5 1.
PROVIDE 12 MM 2-LEGGED STIRRUPS AT 272 MM C/C FOR 1564 MM

```
  20J ______________ 4200X 300X 600 ____________ 21T

 5No12 H 543.  0.TO 1144              5No12 H 543 2881.TO 4200
 7*12c/c272                                         7*12c/c272
        5No12 H  57  547 TO 3478

 00000        00000                    00000        00000
 5#12         5#12                     5#12         5#12

              5#12      5#12    5#12   5#12
              00000     00000   00000  00000
```

BEAM NO. 126 DESIGN RESULTS - FLEXURE PER CODE ACI 318-05

LEN - 4200. MM FY - 414 FC 28. MPA, SIZE - 300. X 600. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA	ANCHOR END
1	57.	5 12MM	547	3478	NO	NO
2	543	5 - 12MM	0	1144.	YES	NO
3	543	5 12MM	2881.	4200.	NO	YES

B E A M N O. 126 D E S I G N R E S U L T S - SHEAR

```
AT START SUPPORT - Vu=  6 06 KNS  Vc=  140 48 KNS  Vs=    0.00 KNS
Tu=    6 98 KN-MET  Tc      5.8 KN-MET  Ts=    9.3 KN MET  LOAD    2
STIRRUPS ARE REQUIRED FOR TORSION.
REINFORCEMENT FOR SHEAR IS PER CL 11 5.5 1
PROVIDE 12 MM 2-LEGGED STIRRUPS AT 181. MM  C/C FOR 1563. MM
ADDITIONAL LONGITUDINAL STEEL REQD  FOR TORSIONAL RESISTANCE    1.77 SQ CM

AT END  SUPPORT   Vu   66.64 KNS  Vc   140 48 KNS  Vs     0 00 KNS
Tu=  6.98 KN MET  Tc=    5 8 KN MET  Ts     9.3 KN-MET  LOAD    2
STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT FOR SHEAR IS PER CL 11 5 5.1.
PROVIDE 12 MM 2 LEGGED STIRRUPS AT 181. MM  C/C FOR 1563  MM
ADDITIONAL LONGITUDINAL STEEL REQD. FOR TORSIONAL RESISTANCE    1 77 SQ.CM.
```

```
  337 ________________  4199x 300x  600__________  ___    341 _

=====================                        ================= |
5No12 H 543 , 0.TO 1144                    5No12 H 543,2881.TO 4200
10*12c/181 |                                   10*12c/181
        5No12 H  57  547 TO 3478
        ===================================================

00000      00000 |                              00000      00000
5#12       5#12  |                              5#12       5#12

           5#12  ,    5#12      5#12      5#12
           00000 |  , 00000     00000     00000
```

BEAM NO. 127 DESIGN RESULTS - FLEXURE PER CODE ACI 318-05

LEN - 4200. MM FY - 414 FC 28. MPA, SIZE - 300. X 600. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA	ANCHOR END
1	57.	5 12MM	547	3478.	NO	NO
2	543.	5 12MM	0	1144.	YES	NO
3	543.	5 12MM	2881.	4200	NO	YES

B E A M N O. 127 D E S I G N R E S U L T S - SHEAR

```
AT START SUPPORT - Vu=   67.85 KNS  Vc   140.63 KNS  Vs      0.00 KNS
Tu=     4 23 KN-MET  Tc=     5 8 KN MET  Ts=    0 0 KN-MET  LOAD     2
NO STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT FOR SHEAR IS PER CL 11 5 5 1
PROVIDE 12 MM 2 LEGGED STIRRUPS AT 272. MM  C/C FOR 1563. MM

AT END   SUPPORT   Vu=   65.86 KNS  Vc   140.63 KNS  Vs=    0.00 KNS
Tu=     4 23 KN MET  Tc      5.8 KN-MET  Ts=    0 0 KN MET  LOAD     2
NO STIRRUPS ARE REQUIRED FOR TORSION.
REINFORCEMENT FOR SHEAR IS PER CL.11 5.5 1
PROVIDE 12 MM 2 LEGGED STIRRUPS AT 272. MM  C/C FOR 1563. MM
```

```
__ 32J____ __ ______________ 4.99X 30JX 600 _______________ 34T__

5No12 H 543  0 TO 1144                      5No12 H 543 2881 TO 4200
 7*12c/c272                                        7*12c/c272
        5No12 H1 57. 547 TO 3478

ooooo |   | ooooo            |    |   ooooo       ooooo
5#12      | 5#12                      5#12         5#12
     |    |                  |    |   |      |
          5#12     5#12      5#12     5#12
        | ooooo    ooooo     ooooo    ooooo
             |
```

BEAM NO. 128 DESIGN RESULTS FLEXURE PER CODE ACI 318-05

LEN - 4200. MM FY - 414 FC - 28 MPA, SIZE 300. X 600. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA	ANCHOR END
1	57	5 12MM	547.	3478.	NO	NO
2	543	5 - 12MM	0	1144	YES	NO
3	543.	5 12MM	2881	4200	NO	YES

B E A M N O. 128 D E S I G N R E S U L T S - SHEAR

AT START SUPPORT Vu= 69.10 KNS Vc= 161.39 KNS Vs= 0.00 KNS
Tu= 1.30 KN-MET Tc= 6.3 KN MET Ts= 0.0 KN MET LOAD 2
NO STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT FOR SHEAR IS PER CL 11.5.5 1.
PROVIDE 12 MM 2-LEGGED STIRRUPS AT 2 2. MM C/C FOR 1563 MM

AT END SUPPORT - Vu= 43.03 KNS Vc= 255 68 KNS Vs= 0.00 KNS
Tu= 0 93 KN-MET Tc= 6.2 KN MET Ts= 0 0 KN MET LOAD 1
STIRRUPS ARE NOT REQUIRED.

```
    40J  _______ ______  4199X 300X  600 ______ ___ _______  39J
 =================                          ===  ===  ==  ==
 5No12 H 543.    0 TO 1144                  5No12 H 543 2881 TO 4200
   *12c/c272
        5No12 H  57. 547.TO 3478
           === ======== ===  =  ==========  ===  ===

 ____________________________________________________________
 ___  ___     ____     ____      ____       ____      ____

 ooooo        ooooo                         ooooo       ooooo
 5#12         5#12                          5#12        5#12

              5#12       5#12      5#12     5#12
              ooooo      ooooo     ooooo    ooooo

 ____      ____       ____      ____      ____       ____
```

BEAM NO. 129 DESIGN RESULTS - FLEXURE PER CODE ACI 318-05

LEN - 4200 MM FY - 414. FC - 28 MPA, SIZE - 300 X 600. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA	ANCHOR END
1	57.	5 - 12MM	547	3478.	NO	NO
2	543.	5 - 12MM	0	1144	YES	NO
3	543.	5 - 12MM	2881	4200	NO	YES

B E A M N O. 129 D E S I G N R E S U L T S - SHEAR

```
AT START SUPPORT - Vu=   44.10 KNS  Vc=  257.91 KNS  Vs=    0.00 KNS
Tu=    0.39 KN-MET  Tc=    6.3 KN MET  Ts=    0.0 KN-MET  LOAD    1
                  STIRRUPS ARE NOT REQUIRED
AT END   SUPPORT - Vu=   67.60 KNS  Vc=  170.74 KNS  Vs=    0.00 KNS
Tu=    0.55 KN-MET  Tc=    6.5 KN MET  Ts=    0.0 KN-MET  LOAD    2
NO STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT FOR SHEAR IS PER  L 11.5.5.1
PROVIDE 12 MM 2-LEGGED STIRRUPS AT 272  MM  C C FOR 1,63  MM
```

```
_ 38J_______________ 4199X 300X 600 ________________ 40J

5N,12 H 543. 0 TO 1144 5No12 H 543 2881 TO 4200 ,
 7*1.c,c27.
 5No12 H 57 547.TO 3478

00000 00000 00000 00000
5#12 5#12 5#12 5#12

 5#12 5#12 5#12 5#12
 00000 00000 00000 00000
```

BEAM NO. 130 DESIGN RESULTS - FLEXURE PER CODE ACI 318-05

LEN - 4200. MM FY - 414. FC - 28. MPA, SIZE - 300. X 600 MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA	ANCHOR END
1	5	5 - 12MM	547	3478.	NO	NO
2	543.	5 12MM	0.	1.44	YES	NO
3	543.	5 - 12MM	2881	4200.	NO	YES

B E A M N O 130 D E S I G N R E S U L T S - SHEAR

```
AT START SUPPORT - Vu= 67.21 KNS Vc 140.58 KNS Vs= 0.00 KNS
Tu 7 94 KN MET Tc 5.8 KN MET Ts= 10 6 KN-MET LOAD 2
STIRRUPS ARE REQUIRED FOR TORSION.
REINFORCEMENT FOR SHEAR IS PER CI 11.5.5 1.
PROVIDE 12 MM 2 LEGGED STIRRUPS AT 181. MM C/C FOR 1563 MM
ADDITIONAL LONGITUDINAL STEEL REQD. FOR TORSIONAL RESISTANCE 2 01 SQ.CM.

AT END SUPPORT - Vu 66 49 KNS Vc 140.58 KNS Vs= 0.00 KNS
Tu= 7 94 KN-MET Tc= 5 8 KN MET Ts= 10.6 KN-MET LOAD 2
STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT FOR SHEAR IS PER CI.1...5 1
PROVIDE 12 MM 2 LEGGED STIRRUPS AT 181 MM C/C FOR 1563 MM
ADDITIONAL LONGITUDINAL STEEL REQD. FOR TORSIONAL RESISTANCE = 2 01 SQ.CM.
```

```
    6J_______________    4199X 300X  600 ________________    7J __

5No12 H 543.  C.TO 1144                        5No . H 543.2881.TO 4200
10*12c/c181 .                                       10*12c/c181
        5No12 H  57. 547 TO 3478

00000       00000                                  00000       00000
5#12        5#12                                   5#12        5#12

            5#12  .    5#12       5#12       5#12       .
            00000      00000      00000      00000
```

BEAM NO. 131 DESIGN RESULTS - FLEXURE PER CODE ACI 318-05

LEN - 4200. MM FY - 414 FC - 28. MPA, SIZE - 300. X 600. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA	ANCHOR END
1	57	5 12MM	547.	3478	NO	NO
2	543	5 12MM	0.	1144	YES	NO
3	543	5 - 12MM	2881	4200	NO	YES

B E A M N O. 131 D E S I G N R E S U L T S - SHEAR

AT START SUPPORT - Vu= 68 0 KNS Vc 140.44 KNS Vs 0 00 KNS
Tu 2.35 KN-MET Tc= 5 8 KN MET Ts= 0 0 KN-MET LOAD 2
NO STIRRUPS ARE REQUIRED FOR TORSION.
REINFORCEMENT FOR SHEAR IS PER CL 11.5.5 1.
PROVIDE 12 MM 2-LEGGED STIRRUPS AT 272. MM C/C FOR 1564. MM

AT END SUPPORT Vu= 6 .67 KNS Vc 140 44 KNS Vs= 0.00 KNS
Tu= 2.35 KN-MET Tc= 5 8 KN-MET Ts 0.0 KN-MET LOAD 2
NO STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT FOR SHEAR IS PER CL 11 5 5.1.
PROVIDE 12 MM 2-LEGGED STIRRUPS AT 272 MM C C FOR 1 64 MM

```
 5J______________________ 4200X 300X 600________________________ 6J

5No12 H 543.  0 TO 1144                          5No12 H 543.2881 TO 4200
 7*12c c272                                         7*12c c272
      5No12 H 57  547.TO 3478

00000      , 00000                              00000      00000
5#12       : 5#12                               5#12       5#12

           5#12  |    5#12       5#12       5#12
           00000 |  | 00000      00000      00000
```

BEAM NO. 132 DESIGN RESULTS - FLEXURE PER CODE ACI 318-05

LEN - 8000. MM FY - 414. FC 28. MPA, SIZE 300. X 600. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA	ANCHOR END
1	63.	3 25MM	731	6936	NO	NO
2	533	3 12MM	0	4458.	YES	NO
3	537.	4 25MM	4427	8000	NO	YES

B E A M N O 132 D E S I G N R E S U L T S - SHEAR

AT START SUPPORT Vu= 242 51 KNS Vc= 129 67 KNS Vs .93.68 KNS
Tu 0.02 KN MET Tc 5 4 KN MET Ts= 0.0 KN-MET LOAD 5
NO STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT IS REQUIRED FOR SHEAR.
PROVIDE 12 MM 2 LEGGED STIRRUPS AT 260 MM C/C FOR 3464 MM

AT END SUPPORT Vu 230.94 KNS Vc= 129.67 KNS Vs 178 25 KNS
Tu= 0.02 KN MET Tc= 5.4 KN-MET Ts= 0.0 KN-MET LOAD 5
NO STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT IS REQUIRED FOR SHEAR
PROVIDE 12 MM 2-LEGGED STIRRUPS AT 260 MM C C FOR 3464 MM

```
 220 _______________ 8000X 300X 600 _______________ 341
===========================================================
3No32 H 533.  0 TO 4458            4No25 H 537.4427 TO 8000
15*12c/c260                                   14*12c/c269
     3No25 H 63. 731.TO 6936
   ===================================================

 000        000        000        0000        0000        0000
 3#32       3#32       3#32       4#25        4#25        4#25

            3#25       3#25       4#25        3#25
            000        000        000         000
```

BEAM NO. 133 DESIGN RESULTS - FLEXURE PER CODE ACI 318-05

LEN - 8000. MM FY - 414. FC 28. MPA, SIZE - 300 X 600. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA	ANCHOR END
1	61.	3 - 20MM	1128	6539.	NO	NO
2	533	2 - 32MM	0	2896	YES	NO
3	539	4 20MM	5 13	8000	NO	YES

B E A M N O 133 D E S I G N R E S U L T S - SHEAR

```
AT START SUPPORT   Vu=  173 19 KNS  Vc=  134.83 KNS  Vs    96 08 KNS
Tu=    0.32 KN-MET  Tc=     5 6 KN-MET  Ts=    0 0 KN-MET  LOAD    5
NO STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT IS REQUIRED FOR SHEAR.
PROVIDE 12 MM 2-LEGGED STIRRUPS AT 270  MM  C C FOR 3464. MM

AT END   SUPPORT   Vu  156 96 KNS  Vc=  134.8  KNS  Vs    74 45 KNS
Tu=    0.32 KN-MET  Tc=     5 6 KN-MET  Ts=    0.0 KN-MET  LOAD    5
NO STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT IS REQUIRED FOR SHEAR.
PROVIDE 12 MM 2-LEGGED STIRRUPS AT 270. MM  C C FOR 3464. MM
```

```
   20J                    8000X 300X  600                        35J

2No32 H 533    0.TO 2896                4No20 H 539 5113 TO 8000
14*12c c270                                    14*12c/c270
       3No20 H  61 1128.TO 6539

 CO         OO                               0000        0 00
 2#32       2#32                             4#20        4#20

            3#20       3#20      3#20        3#20
             000        000       000         000
```

BEAM NO. 134 DESIGN RESULTS - FLEXURE PER CODE ACI 318-05

LEN - 8000. MM FY - 414. FC - 28. MPA, SIZE - 300 X 600. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA	ANCHOR END
1	61.	3 20MM	1155.	6511.	NO	NO
2	539.	4 20MM	0	2554.	YES	NO
3	537.	3 25MM	4999	8000	NO	YES

B E A M N O. 134 D E S I G N R E S U L T S - SHEAR

AT START SUPPORT - Vu= 157.32 KNS Vc= 133.57 KNS Vs= 76.20 KNS
Tu= 0.58 KN MET Tc= 5.6 KN MET Ts= 0.0 KN MET LOAD
NO STIRRUPS ARE REQUIRED FOR TORSION.
REINFORCEMENT IS REQUIRED FOR SHEAR.
PROVIDE 12 MM 2-LEGGED STIRRUPS AT 270. MM C/C FOR 3464 MM

AT END SUPPORT Vu= 168.69 KNS Vc= 133.55 KNS Vs= 91.37 KNS
Tu= 0.58 KN MET Tc= 5.6 KN-MET Ts 0.0 KN-MET LOAD 5
NO STIRRUPS ARE REQUIRED FOR TORSION.
REINFORCEMENT IS REQUIRED FOR SHEAR.
PROVIDE 12 MM 2 LEGGED STIRRUPS AT 270 MM C C FOR 3464. MM

```
___ 36J ____________________ 8000X 300X 600 ______ ______ 19J ___

==============================          ==============================
4No20 H 539.1 0.TO 2554                 3No25 H 537.4999 TO 8000
14*12c/c270                             14*12c/c270
        3No20 H 61.1155.TO 6511
        ================================================

0000   | | 0000 |  |                      000           000
4#20   | | 4#20 |  |                      3#25          3#25
       | |      |  |
       | | 3#20 |  | 3#20     3#20        3#20
       | |  000 |  |  000      000         000
```

BEAM NO. 135 DESIGN RESULTS - FLEXURE PER CODE ACI 318-05

LEN - 8000. MM FY - 414. FC - 28. MPA, SIZE - 300 X 600 MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA	ANCHOR END
1	63	2 - 25MM	954.	6713	NO	NO
2	539	4 20MM	0.	2554	YES	NO
3	537	3 - 25MM	4999	8000.	NO	YES

B E A M N O 135 D E S I G N R E S U L T S - SHEAR

```
AT START SUPPORT - Vu= 163.44 KNS  Vc= 129.46 KNS  Vs= 88 47 KNS
Tu  0 94 KN-MET  Tc= 5.4 KN MET  Ts= 0 0 KN MET  LOAD 5
NO STIRRUPS ARE REQUIRED FOR TORSION.
REINFORCEMENT IS REQUIRED FOR SHEAR
PROVIDE 12 MM 2-LEGGED STIRRUPS AT 269 MM C/C FOR 3464. MM

AT END SUPPORT  Vu= 166.71 KNS  Vc 129 46 KNS  Vs= 92 82 KNS
Tu  0 94 KN-MET  Tc= 5.4 KN MET  Ts= 0 0 KN-MET  LOAD 5
NO STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT IS REQUIRED FOR SHEAR
PROVIDE 12 MM 2 LEGGED STIRRUPS AT 269 MM C/C FOR 3464 MM
```

```
    8J                          8000X 500X 600                          11

4No20 H 539.| 0.TO 2554                              3No25 H 537 4999.TO 8000
14*12c/c269                                                   14*12c c269
       2No25 H  63. 954.TO 6713

0000          0000                                   000          000
4#20          4#20 |                                 3#25         3#25
                   |
              2#25       2#25         2#25          2#25
               OO         OO           OO            OO
```

BEAM NO. 136 DESIGN RESULTS - FLEXURE PER CODE ACI 318-05

LEN 8000. MM FY - 414. FC - 28. MPA, SIZE - 500. X 800. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA	ANCHOR END
1	57.	11 - 12MM	667	7007	NO	NO
2	743.	11 12MM	0	1111	YES	NO
3	743.	11 12MM	6556.	8000	NO	YES

B E A M N O. 136 D E S I G N R E S U L T S - SHEAR

```
AT START SUPPORT  Vu  148 01 KNS  Vc=  318.78 KNS  Vs=    0 00 KNS
Tu=    0.37 KN-MET  Tc=   19 8 KN MET  Ts=    0 0 KN MET  LOAD    2
NO STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT FOR SHEAR IS PER CL.11.5.5 1
PROVIDE 12 MM 2-LEGGED STIRRUPS AT 372  MM  C/C FOR 3264. MM

AT END   SUPPORT   Vu=  166 53 KNS  Vc=  318.78 KNS  Vs     0 00 KNS
Tu=    0 37 KN-MET  Tc=   19 8 KN-MET  Ts      0.0 KN-MET  LOAD    2
NO STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT FOR SHEAR IS PER CL 11 5 5 1.
PROVIDE 12 MM 2-LEGGED STIRRUPS AT 372  MM  C/C FOR 3264  MM
```

11 8000X 500X 800 151

11No12 H 743 0.TO 1111 11No12 H 743 6556 TO 8000

10*12c/c372 10*12c c372

1No12 H 57 660 TO 7007

000000000 000000000

000000000 000000000 000000000 000000000

BEAM NO. 137 DESIGN RESULTS FLEXURE PER CODE ACI 318-05

LEN - 8000 MM FY - 414 FC - 28 MPA, SIZE - 300. X 600. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA	ANCHOR END
1	61	3 - 20MM	1.5.	6515	NO	NO
2	537	3 - 25MM	0	2668.	YES	NO
3	539	4 20MM	115.	8000	NO	YES

B E A M N O. 137 D E S I G N R E S U L T S - SHEAR

AT START SUPPORT - Vu= 166 77 KNS Vc 134.22 KNS Vs= 90 81 KNS
Tu= 0.58 KN MET Tc 5.6 KN-MET Ts= 0 0 KN-MET LOAD 5
NO STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT IS REQUIRED FOR SHEAR
PROVIDE 12 MM 2 LEGGED STIRRUPS AT 2 0 MM C C FOR 3464. MM

AT END SUPPORT Vu 157.24 KNS Vc= 134 22 KNS Vs 75.43 KNS
Tu 0 58 KN-MET Tc= 5 6 KN MET Ts= 0 0 KN-MET LOAD 5
NO STIRRUPS ARE REQUIRED FOR TORSION
REINFORCEMENT IS REQUIRED FOR SHEAR
PROVIDE 12 MM 2 LEGGED STIRRUPS AT 270 MM C,C FOR 3464 MM



```
==============================================================================

     COLUMN  NO.   682  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY   413.7  FC    27.6 MPA,  SQRE SIZE   450 0 X 450 0 MMS, TIED
       AREA OF STEEL REQUIRED   2592 0  SQ  MM

BAR CONFIGURATION        REINF PCT.   LOAD   LOCATION   PHI
--                      -------              ------------

  4   32 MM                 1 589        5      STA      0 650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM

==============================================================================

     COLUMN  NO.   683  DESIGN PER ACI 318 05 - AXIAL + BENDING

FY - 413.7  FC -  27.6 MPA,  SQRE SIZE   450.0 X 450 0 MMS, TIED
       ONLY MINIMUM STEEL IS REQUIRED
       AREA OF STEEL REQUIRED =  2025.0  SQ  MM

BAR CONFIGURATION        REINF PCT    LOAD   LOCATION   PHI
---         -----            ---         -----

  4   32 MM                 1.589        2      END      0.650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM

==============================================================================

     COLUMN  NO.   684  DESIGN PER ACI 318 05 - AXIAL + BENDING

FY - 413.7  FC    27.6 MPA,  SQRE SIZE - 450.0 X 450.0 MMS, TIED
       ONLY MINIMUM STEEL IS REQUIRED.
       AREA OF STEEL REQUIRED -  2025 0  SQ. MM

BAR CONFIGURATION        REINF PCT.   LOAD   LOCATION   PHI
---      ----        ---        ---        ----        ----

  4 - 32 MM                 1.589        2      END      0.650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM
```

COLUMN NO 685 DESIGN PER ACI 318-05 - AXIAL + BENDING

FY 413.7 FC 27.6 MPA, SQRE SIZE - 450.0 X 450.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED.
AREA OF STEEL REQUIRED = 2025.0 SQ. MM

BAR CONFIGURATION REINF PCT LOAD LOCATION PHI

4 - 32 MM 1.589 2 END 0.650
PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER 12 SPACING 450.00 MM

COLUMN NO. 686 DESIGN PER ACI 318-05 - AXIAL + BENDING

FY - 413.7 FC 27.6 MPA, SQRE SIZE 450.0 X 450.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED
AREA OF STEEL REQUIRED 2025.0 SQ. MM

BAR CONFIGURATION REINF PCT LOAD LOCATION PHI

4 - 32 MM 1.589 2 END 0.650
PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER 12 SPACING 450.00 MM

COLUMN NO. 687 DESIGN PER ACI 318-05 - AXIAL + BENDING

FY 413.7 FC - 27.6 MPA, SQRE SIZE 450.0 X 450.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED.
AREA OF STEEL REQUIRED 2025.0 SQ. MM

BAR CONFIGURATION REINF PCT LOAD LOCATION PHI

4 - 32 MM 1.589 2 END 0.650
(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER 12 SPACING 450.00 MM

COLUMN NO. 688 DESIGN PER ACI 318-05 - AXIAL + BENDING

FY 413.7 FC - 27.6 MPA, SQRE SIZE - 450.0 X 450.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED.
AREA OF STEEL REQUIRED = 2025.0 SQ. MM

BAR CONFIGURATION	REINF PCT.	LOAD	LOCATION	PHI
4 - 32 MM	1.589	2	END	0.650

(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER 12 SPACING 450.00 MM

COLUMN NO. 689 DESIGN PER ACI 318-05 - AXIAL + BENDING

FY - 413.7 FC 27.6 MPA, SQRE SIZE 450.0 X 450.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED
AREA OF STEEL REQUIRED 2025.0 SQ. MM

BAR CONFIGURATION	REINF PCT.	LOAD	LOCATION	PHI
4 - 32 MM	1.589	2	END	0.650

PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER 12 SPACING 450.00 MM

COLUMN NO. 695 DESIGN PER ACI 318 05 - AXIAL + BENDING

FY 413.7 FC 27.6 MPA, SQRE SIZE 450.0 X 450.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED.
AREA OF STEEL REQUIRED = 2025.0 SQ MM

BAR CONFIGURATION	REINF PCT.	LOAD	LOCATION	PHI
4 - 32 MM	1.589	2	END	0.650

PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER 12 SPACING 450.00 MM

COLUMN NO. 1809 DESIGN PER ACI 318-05 - AXIAL + BENDING

```
FY - 413.7  FC - 27.6 MPA,  SQRE SIZE  450.0 X 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED.
        AREA OF STEEL REQUIRED =  2025.0  SQ. MM

BAR CONFIGURATION        REINF PCT.   LOAD   LOCATION   PHI
----------------------------------------------------------

  4 - 32 MM                1.589        2      END      0.650
(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER   12 SPACING 450.00 MM
```

COLUMN NO. 1816 DESIGN PER ACI 318-05 - AXIAL + BENDING

```
FY   413.7  FC -  27.6 MPA,  SQRE SIZE  450.0 X 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED.
        AREA OF STEEL REQUIRED =  2025.0  SQ. MM

BAR CONFIGURATION        REINF PCT    LOAD   LOCATION   PHI
----------------------------------------------------------

  4 - 32 MM                1.589        2      END      0.650
(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM
```

COLUMN NO. 1823 DESIGN PER ACI 318-05 - AXIAL + BENDING

```
FY   413.7  FC    27.6 MPA,  SQRE SIZE  450.0 X 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED.
        AREA OF STEEL REQUIRED =  2025.0  SQ. MM

BAR CONFIGURATION        REINF PCT    LOAD   LOCATION   PHI
----------------------------------------------------------

  4 - 32 MM                1.589        2      END      0.650
(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM
```

COLUMN NO. 1830 DESIGN PER ACI 318 05 - AXIAL + BENDING

```
FY - 413.7  FC     27.6 MPA,  SQRE SIZE   450.0 X 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED =  2025.0   SQ  MM

BAR CONFIGURATION        REINF PCT.   LOAD   LOCATION   PHI
----                     ------------                   --

  4 - 32 MM                 1.589       2       END      0.650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM
```

COLUMN NO. 1901 DESIGN PER ACI 318-05 AXIAL + BENDING

```
FY - 413.7  FC     27.6 MPA,  SQRE SIZE   450.0 X 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED    2025.0   SQ. MM

BAR CONFIGURATION        REINF PCT    LOAD   LOCATION   PHI
----        ------------            ------------------  --

  4   32 MM                 1.589       2       END      0.650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM
```

COLUMN NO. 1917 DESIGN PER ACI 318-05 - AXIAL + BENDING

```
FY   413.7  FC     27.6 MPA,  RECT SIZE - 450.0 X 850.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED.
        AREA OF STEEL REQUIRED    8325.   SQ  MM

BAR CONFIGURATION        REINF PCT.   LOAD   LOCATION   PHI
   ---          ----------           ---    -          ---

 12   32 MM                 1.159       2       END      0.650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM
```

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==========================================================================

     COLUMN  NO.  1830  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY   41  7  FC    27 6 MPA,  SQRE SIZE   450 0 X 450 0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED.
        AREA OF STEEL REQUIRED =  2025.0  SQ. MM

BAR CONFIGURATION       REINF PCT    LOAD   LOCATION   PHI
----------       ----           --          -----

  4    32 MM                 1 589        2      END      0 650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM

==========================================================================

     COLUMN  NO.  1901  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY   413 7  FC    27 6 MPA,  SQRE SIZE   450 0 X 450 0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED =  2025.0  SQ  MM

BAR CONFIGURATION       REINF PCT    LOAD   LOCATION   PHI
--------  ---------  ---------    -------   - --------

  4    32 MM                 1.589        2      END      0 650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM

==========================================================================

     COLUMN  NO.  1917  DESIGN PER ACI 318-05   AXIAL + BENDING

FY   413 7  FC    27.6 MPA,  RECT SIZE   450 0 X1850.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED =  8325.   SQ  MM

BAR CONFIGURATION       REINF PCT    LOAD   LOCATION   PHI
                --  ---------  ------- ----    --------

 12    32 MM                 1 159        2      END      0 650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM
```

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     COLUMN  NO.  1918  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY - 413.7  FC -  27.6 MPA,  RECT SIZE - 450.0 X1850.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED.
        AREA OF STEEL REQUIRED    8325.0  SQ  MM

BAR CONFIGURATION        REINF PCT    LOAD  LOCATION   PHI
----------------------------------------------------------

 12   32 MM                 1.159        2      END      0.650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM

====================================================================

     COLUMN  NO.  1919  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY - 413.7  FC -  27.6 MPA,  RECT SIZE   450.0 X1850.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED =  8325.0  SQ  MM

BAR CONFIGURATION        REINF PCT    LOAD  LOCATION   PHI
----------------------------------------------------------

 12   32 MM                 1.159        2      END      0.650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM

====================================================================

     COLUMN  NO   1920  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY   413.7  FC -  27.6 MPA,  RECT SIZE   450.0 X1850.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED =  8325.0  SQ  MM

BAR CONFIGURATION        REINF PCT    LOAD  LOCATION   PHI
----------------------------------------------------------

 12   32 MM                 1.159        2      END      0.650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER   12 SPACING 450.00 MM
```

```
=============================================================================

    COLUMN  NO   1963  DESIGN PER ACI 318 05 - AXIAL + BENDING

FY   413 7  F.     27.6 MPA,  SQRE SIZE   450 C X 450.0 MMS, TIED
        ONLY M.NIMUM STEEL IS REQU.RED.
        AREA OF STEEL REQUIRED   2025 0  SQ  MM

BAR CONFIGURATION        REINF PCT.  LOAD  LOCATION  PHI
---  ----------     ----- ----   -----    -   -----

  4   32 MM                1 589      2     END    0 650
 PROV DE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450 00 MM

=============================================================================

    COLUMN  NO.  1964  DESIGN PER ACI 318-05   AXIAL + BENDING

FY   413.7  FC    27.6 MPA,  SQRE SIZE   450 0 X 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED    2025.0  SQ  MM

BAR CONFIGURATION        REINF PCT    LOAD  LOCATION  PH.
---    --   --   ---- -----  ---    -   -   -----   --

  4   32 MM                1.589      2     END    0 650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM

=============================================================================

    COLUMN  NO.  1965  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY - 413.7  FC    27.6 MPA,  SQRE SIZE - 450.0 X 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED.
        AREA OF STEEL REQUIRED =  2025.0  SQ  MM

BAR CONFIGURATION        REINF PCT    LOAD  LOCATION  PHI
   -----  -   ----- ----   -   ----    -    -     --

  4   32 MM                1.589      2     END    0 650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM
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=====================================================================

     COLUMN  NO   1966  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY   413.7  FC    27.6 MPA,  SQRE SIZE   450.0 X 450.0 MMS, TIED
       ONLY MINIMUM STEEL IS REQUIRED.
       AREA OF STEEL REQUIRED =  2025.0  SQ. MM

BAR CONFIGURATION        REINF PCT    LOAD  LOCATION   PHI
----------------        ---------    ----  --------   ---

  4   32 MM                 1.589        2      END     0 650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE,
TIE BAR NUMBER   12 SPACING 450.00 MM

=====================================================================

     COLUMN  NO   1971  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY - 413 7  FC -  27 6 MPA,  SQRE SIZE - 450 0 X 450.0 MMS, TIED
       ONLY MINIMUM STEEL IS REQUIRED
       AREA OF STEEL REQUIRED    2025 0  SQ. MM

BAR CONFIGURATION        REINF PCT    LOAD  LOCATION   PHI
----------------        ---------    ----  --------   ---

  4   32 MM                 1.589        2      END     0 650
(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER   12 SPACING 450.00 MM

=====================================================================

     COLUMN  NO   1972  DESIGN PER ACI 318-05   AXIAL + BENDING

FY - 413.7  FC -  27 6 MPA,  SQRE SIZE   450 0 X 450 0 MMS, TIED
       ONLY MINIMUM STEEL IS REQUIRED.
       AREA OF STEEL REQUIRED =  2025.0  SQ. MM

BAR CONFIGURATION        REINF PCT.   LOAD  LOCATION   PH
----------------        ---------    ----  --------   ---

  4   32 MM                 1.589        2      END     0 650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR N MBER   12 SPACING 450.00 MM
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COLUMN NO 1973 DESIGN PER ACI 318-05 AXIAL + BENDING

```
FY  413.7  FC   27.6 MPA,  SQRE SIZE  450.0 X 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED =  2025.0  SQ. MM

BAR CONFIGURATION        REINF PCT    LOAD   LOCATION   PHI
--------  -------      -----          -          --       ----

  4   32 MM                 1.589         2       END      0.650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
 IE BAR NUMBER   12 SPACING 450.00 MM
```

COLUMN NO. 1974 DESIGN PER ACI 318-05 - AXIAL + BENDING

```
FY   413.7  FC    27.6 MPA,  SQRE SIZE   450.0 X 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED    2025.0  SQ. MM

BAR CONFIGURATION        REINF PCT.   LOAD   LOCATION   PHI

  4   32 MM                 1.589         2       END      0.650
(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM
```

COLUMN NO 1975 DESIGN PER ACI 318 05 - AXIAL + BENDING

```
FY   413.7  FC - 27.6 MPA,  SQRE SIZE   450.0 X 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED.
        AREA OF STEEL REQUIRED    2025.0  SQ. MM

BAR CONFIGURATION        REINF PCT.   LOAD   LOCATION   PHI
  ------    ----       ---            -          -        ---

  4   32 MM                 1.589         2       END      0.650
(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM
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COLUMN NO. 1976 DESIGN PER ACI 318-05 - AXIAL + BENDING

FY - 413.7 FC 27.6 MPA, SQRE SIZE - 450.0 X 450.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED
AREA OF STEEL REQUIRED = 2025.0 SQ MM

BAR CONFIGURATION	REINF PCT	LOAD	LOCATION	PHI
4 32 MM	1 589	2	END	0 650

PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER 12 SPACING 450 00 MM

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COLUMN NO. 1981 DESIGN PER ACI 318-05 - AXIAL + BENDING

FY 413 7 FC 27.6 MPA, SQRE SIZE 450.0 X 450.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED
AREA OF STEEL REQUIRED 2025.0 SQ MM

BAR CONFIGURATION	REINF PCT.	LOAD	LOCATION	PHI
4 32 MM	1.589	2	END	0 650

PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER 12 SPACING 450.00 MM

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COLUMN NO. 1982 DESIGN PER ACI 318-05 AXIAL + BENDING

FY 413 7 FC 27.6 MPA, SQRE SIZE 450 0 X 450 0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED
AREA OF STEEL REQUIRED = 2025 0 SQ. MM

BAR CONFIGURATION	REINF PCT	LOAD	LOCATION	PHI
4 - 32 MM	1.589	2	END	0.650

PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER 12 SPACING 450 00 MM

COLUMN NO. 1983 DESIGN PER ACI 318 05 - AXIAL + BENDING

```
FY - 413.7  FC -  27.6 MPA,  SQRE SIZE  450.0 X 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED =  2025.0  SQ. MM

BAR CONFIGURATION        REINF PCT.   LOAD   LOCATION   PHI
-----------------        ----------   ----   --------   ---

  4 - 32 MM                  1.589        2      END      0.650
 (PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER   12 SPACING 450.00 MM
```

COLUMN NO. 1984 DESIGN PER ACI 318-05 - AXIAL + BENDING

```
FY - 413.7  FC -  27.6 MPA,  SQRE SIZE - 450.0 X 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED =  2025.0  SQ. MM

BAR CONFIGURATION        REINF PCT.   LOAD   LOCATION   PHI
-----------------        ----------   ----   --------   ---

  4 - 32 MM                  1.589        2      END      0.650
 (PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER   12 SPACING 450.00 MM
```

COLUMN NO. 1985 DESIGN PER ACI 318-05 - AXIAL + BENDING

```
FY - 413.7  FC -  27.6 MPA,  SQRE SIZE  450.0 X 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED =  2025.0  SQ. MM

BAR CONFIGURATION        REINF PCT.   LOAD   LOCATION   PHI
-----------------        ----------   ----   --------   ---

  4 - 32 MM                  1.589        2      END      0.650
 (PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER   12 SPACING 450.00 MM
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    COLUMN  NO.  1990  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY   413.7  FC -  27.6 MPA,  SQRE SIZE   450 0 X 450 0 MMS, TIED
        AREA OF STEEL REQUIRED =  2166.8  SQ  MM

BAR CONFIGURATION       REINF PCT.   LOAD   LOCATION   PHI
 --   -----     --     ----      -    ------    ------

  4 - 32 MM               1.589        5      STA      0 650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM

==========================================================================

    COLUMN  NO.  1991  DESIGN PER ACI 318-05   AXIAL + BENDING

FY   413.7  FC    27.6 MPA,  SQRE SIZE - 450.0 X 450 0 MMS, TIED
        AREA OF STEEL REQUIRED =  2733 7  SQ. MM

BAR CONFIGURATION       REINF PCT.   LOAD   LOCATION   PHI
---     -    --    ---- ----      -    -     ----    --

  4   32 MM               1 589        5      STA      0 650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450 00 MM

==========================================================================

    COLUMN  NO   1992  DESIGN PER ACI 318 05 - AXIAL + BENDING

FY   413 7  FC -  27.6 MPA,  SQRE SIZE   450 0 X 450 0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED =  2025 0  SQ  MM

BAR CONFIGURATION       REINF PCT    LOAD   LOCATION   PHI
---------------------------------------------------------

  4   32 MM               1 589        2      END      0.650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM
```

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COLUMN NO. 1993 DESIGN PER ACI 318-05 - AXIAL + BENDING

FY 413.7 FC 27.6 MPA, SQRE SIZE - 450 0 X 450.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED.
AREA OF STEEL REQUIRED = 2025.0 SQ. MM

BAR CONFIGURATION	REINF PCT	LOAD	LOCATION	PHI
4 - 32 MM	1.589	2	END	0 650

PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER 12 SPACING 450.00 MM

==

COLUMN NO. 1994 DESIGN PER ACI 318-05 AXIAL + BENDING

FY 413.7 FC - 27.6 MPA, SQRE SIZE 450.0 X 450 0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED.
AREA OF STEEL REQUIRED = 2025.0 SQ. MM

BAR CONFIGURATION	REINF PCT	LOAD	LOCATION	PHI
4 32 MM	1 589	2	END	0.650

PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER 12 SPACING 450.00 MM

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COLUMN NO. 2011 DESIGN PER ACI 318 05 - AXIAL + BENDING

Y 413 7 FC 27.6 MPA, SQRE SIZE 4 0 0 X 450 0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED
AREA OF STEEL REQUIRED = 2025.0 SQ. MM

BAR CONFIGURATION	REINF PCT.	LOAD	LOCATION	PHI
4 - 32 MM	1.589	2	END	0 650

PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER 12 SPACING 450 00 MM

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=====================================================================

     COLUMN  NO.  2012  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY - 413.7  FC -  27.6 MPA,  SQRE SIZE   450.0 X 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED.
        AREA OF STEEL REQUIRED =  2025.0  SQ  MM

BAR CONFIGURATION        REINF PCT    LOAD   LOCATION   PHI
----   ------   ---------   ------      -----

  4 - 32 MM                1.589        2      END      0.650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM

=====================================================================

     COLUMN  NO.  2013  DESIGN PER ACI 318-05   AXIAL + BENDING

FY   413.7  FC -  27.6 MPA,  SQRE SIZE - 450.0 X 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED    2025.0  SQ  MM

BAR CONFIGURATION        REINF PCT    LOAD   LOCATION   PHI
 -------  ------------               -----------

  4 - 32 MM                1.589        2      END      0.650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER   12 SPACING 450.00 MM

=====================================================================

     COLUMN  NO.  2014  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY   413.7  FC -  27.6 MPA,  SQRE SIZE - 450.0 x 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED    2025.0  SQ  MM

BAR CONFIGURATION        REINF PCT    LOAD   LOCATION   PHI
--       ------------       ------------         ---

  4 - 32 MM                1.589        2      END      0.650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM
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    COLUMN  NO.  2015  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY = 413.7  FC =  27.6 MPA,  SQRE SIZE  450.0 X 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED =  2025.0  SQ  MM

BAR CONFIGURATION       REINF PCT    LOAD   LOCATION   PHI
--------------------------------------------------------------

  4   32 MM                1.589        2      END     0.650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM

================================================================

    COLUMN  NO   2016  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY   413.7  FC   27.6 MPA,  SQRE SIZE  450.0 X 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED    2025.0  SQ  MM

BAR CONFIGURATION       REINF PCT    LOAD   LOCATION   PHI
 ------                 -------             -------------

  4   32 MM                1.589        2      END     0.650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450.00 MM

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    COLUMN  NO.  2017  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY - 413.7  FC   27.6 MPA,  SQRE SIZE  450.0 X 450.0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED    2025.0  SQ. MM

BAR CONFIGURATION       REINF PCT.   LOAD   LOCATION   PHI
 ----                  ---------            -------------

  4   32 MM                1.589        2      END     0.650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER   12 SPACING 450.00 MM
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     COLUMN  NO.  2018  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY - 413.7  FC - 27.6 MPA,  SQRE SIZE - 450.0 X 450.0 MMS, TIED
       ONLY MINIMUM STEEL IS REQUIRED
       AREA OF STEEL REQUIRED = 2025.0  SQ. MM

BAR CONFIGURATION       REINF PCT    LOAD   LOCATION   PHI
-----------------     -----------  ---------------   -----

  4 - 32 MM                1.589        2      END      0.650
 (PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER   12 SPACING 450.00 MM

====================================================================

     COLUMN  NO.  2019  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY - 413.7  FC - 27.6 MPA,  SQRE SIZE - 450.0 X 450.0 MMS, TIED
       ONLY MINIMUM STEEL IS REQUIRED
       AREA OF STEEL REQUIRED = 2025.0  SQ. MM

BAR CONFIGURATION       REINF PCT    LOAD   LOCATION   PHI
-----------------     -----------  ---------------   -----

  4 - 32 MM                1.589        2      END      0.650
 (PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER   12 SPACING 450.00 MM

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     COLUMN  NO.  2020  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY - 413.7  FC - 27.6 MPA,  SQRE SIZE - 450.0 X 450.0 MMS, TIED
       ONLY MINIMUM STEEL IS REQUIRED
       AREA OF STEEL REQUIRED = 2025.0  SQ. MM

BAR CONFIGURATION       REINF PCT    LOAD   LOCATION   PHI
-----------------     -----------  ---------------   -----

  4 - 32 MM                1.589        2      END      0.650
 (PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER   12 SPACING 450.00 MM
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     COLUMN  NO   2021  DESIGN PER ACI 318 05 - AXIAL + BENDING

FY   413 7  FC    27 6 MPA,  SQRE SIZE   450 0 X 450 0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED.
        AREA OF STEEL REQUIRED =  2025.0  SQ  MM

BAR CONFIGURATION        REINF PCT.   LOAD   LOCATION   PHI
----------------------------------------------------------

  4   32 MM                1.589        2       END      0 650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE
TIE BAR NUMBER   12 SPACING 450 00 MM

=====================================================================

     COLUMN  NO.  2022  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY   413.7  FC    27.6 MPA,  SQRE SIZE   450.0 X 450 0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED
        AREA OF STEEL REQUIRED =  2025 0  SQ. MM

BAR CONFIGURATION        REINF PCT    LOAD   LOCATION   PHI
----------------------------------------------------------

  4   32 MM                1 589        2       END      0 650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER   12 SPACING 450 00 MM

=====================================================================

     COLUMN  NO.  2023  DESIGN PER ACI 318-05 - AXIAL + BENDING

FY - 413 7  FC    27 6 MPA,  SQRE SIZE   450 0 X 450 0 MMS, TIED
        ONLY MINIMUM STEEL IS REQUIRED.
        AREA OF STEEL REQUIRED =  2025.0  SQ. MM

BAR CONFIGURATION        REINF PCT.   LOAD   LOCATION   PHI
----------------------------------------------------------

  4   32 MM                1.589        2       END      0.650
 PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER   12 SPACING 450.00 MM
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ELEMENT DESIGN SUMMARY
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ELEMENT    LONG. REINF      MOM-X /LOAD    TRANS  REINF      MOM-Y /LOAD
           (SQ MM/MM)     (KN-MM/MM)        (SQ.MM/MM)      (KN-MM/MM)

      FY    413.682 MPA FC     27.579 MPA COVER:    19.050 MM TH    240.000 MM
  327 TOP   Longitudinal direction   Only minimum steel required
  327 BOTT  Longitudinal direction   Only minimum steel required
  327 TOP   Transverse direction     Only minimum steel required.
  327 BOTT  Transverse direction     Only minimum steel required.
  327 TOP :      0.432          1.22  /    5        0.432            0.64  /    5
      BOTT:      0.432          0.00  /    0        0.432            0.03  /

      FY    413.682 MPA FC     27.579 MPA COVER     19.050 MM TH    240.000 MM
  328 TOP   Longitudinal direction   Only minimum steel required.
  328 BOTT  Longitudinal direction   Only minimum steel required
  328 TOP   Transverse direction     Only minimum steel required
  328 BOTT  Transverse direction     Only minimum steel required
  328 TOP        0.432          0.20  /    6        0.432            0.43       6
      BOTT:      0.432          0.11       3        0.432            0.00  /    1

      FY    413.682 MPA FC:    27.579 MPA COVER:    19.050 MM TH    240.000 MM
  329 TOP   Longitudinal direction   Only minimum steel required.
  329 BOTT  Longitudinal direction - Only minimum steel required
  329 TOP   Transverse direction     Only minimum steel required
  329 BOTT  Transverse direction   - Only minimum steel required.
  329 TOP :      0.432          0.72  /    5        0.432            0.76       5
      BOTT:      0.432          0.00  /    3        0.432            0.08  /

      FY:   413.682 MPA FC:    27.579 MPA COVER     19.050 MM TH:   240.000 MM
  330 TOP : Longitudinal direction   Only minimum steel required.
  330 BOTT: Longitudinal direction   Only minimum steel required.
  330 TOP : Transverse direction   - Only minimum steel required
  330 BOTT  Transverse direction     Only minimum steel required.
  330 TOP        0.432          0.00       5        0.432            0.04  /    3
      BOTT       0.432          0.71  /    5        0.432            0.44  /    6

      FY    413.682 MPA FC     27.579 MPA COVER     19.050 MM TH    240.000 MM
  331 TOP   Longitudinal direction   Only minimum steel required
  331 BOTT  Longitudinal direction - Only minimum steel required.
  331 TOP   Transverse direction     Only minimum steel required
  331 BOTT: Transverse direction     Only minimum steel required.
  331 TOP :      0.432          0.33  /    6        0.432            2.61  /    6
      BOTT:      0.432          0.03  /             0.432            0.02  /    6

      FY:   413.682 MPA FC:    27.579 MPA COVER     19.050 MM TH    240.000 MM
  332 TOP   Longitudinal direction   Only minimum steel required
  332 BOTT  Longitudinal direction   Only minimum steel required
  332 TOP   Transverse direction   - Only minimum steel required.
  332 BOTT  Transverse direction     Only minimum steel required
  332 TOP :      0.432          0.00  /    6        0.432            0.16  /    5
      BOTT       0.432          0.41       6        0.432            0.05

      FY    413.682 MPA FC     27.579 MPA COVER     19.050 MM TH    240.000 MM
  333 TOP   Longitudinal direction - Only minimum steel required
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333 BOTT  Longitudinal direction - Only minimum steel required
333 TOP   Transverse direction     Only minimum steel required.
333 BOTT: Transverse direction     Only minimum steel required
333 TOP       0.432          0.00 /    6       0 432          0 00 ,     5
    BOTT      0 432          0.72 /    5       0.432          3.49       6

    FY    413 682 MPA FC:     27 579 MPA COVER     19 050 MM TH.    240 000 MM
334 TOP   Longitudinal direction   Only minimum steel required
334 BOTT  Longitudinal direction - Only minimum steel required
334 TOP   Transverse direction   - Only minimum steel required.
334 BOTT  Transverse direction   - Only minimum steel required
334 TOP       0.432          0 00 /    6       0 432          0 03 /     3
    BOTT      0.432          0.65 ,    6       0 432          0 35       6

    FY:   413.682 MPA FC      27 579 MPA COVER     19.050 MM TH    160 000 MM
335 TOP   Longitudinal direction   Only minimum steel required
335 BOTT  Longitudinal direction - Only minimum steel required.
335 TOP   Transverse direction     Only minimum steel required.
335 BOTT  Transverse direction   - Only minimum steel required.
335 TOP       0.288          0 00 /    6       0 288          4.97       5
    BOTT      0.288          5 64 /    5       0 288          0.00 /     6

    FY.   413.682 MPA FC      27 579 MPA COVER     19 050 MM TH    160 000 MM
385 TOP   Longitudinal direction   Only minimum steel required
385 BOTT  Longitudinal direction - Only minimum steel required
385 TOP   Transverse direction     Only minimum steel required
385 BOTT  Transverse direction   - Only minimum steel required
385 TOP       0 288          1 26      5       0 288          0.00 /     5
    BOTT      0.288          0 00 /    5       0 288          4 29 ,     6

    FY    413 682 MPA FC      27 579 MPA COVER     19 050 MM TH    160 000 MM
387 TOP   Longitudinal direction   Only minimum steel required.
387 BOTT  Longitudinal direction   Only minimum steel required.
387 TOP   Transverse direction   - Only minimum steel required.
387 BOTT  Transverse direction     Only minimum steel required.
387 TOP :     0.288          0 00 /    5       0 288          4 24       5
    BOTT      0.288          6 68 ,    5       0 288          0 00 /     6

    FY    413.682 MPA FC      27.579 MPA COVER     19.050 MM TH    160 000 MM
394 TOP . Longitudinal direction - Only minimum steel required.
394 BOTT  Longitudinal direction   Only minimum steel required.
394 TOP   Transverse direction   - Only minimum steel required
394 BOTT  Transverse direction     Only minimum steel required
394 TOP       0.288          0 00      5       0.288          4 99 /     6
    BOTT.     0.288          1 [illegible] /            0 288          0 00       6

    FY    413 682 MPA FC      27 579 MPA COVER     19 050 MM TH    160 000 MM
397 TOP   Longitudinal direction   Only minimum steel required
397 BOTT  Longitudinal direction   Only minimum steel required
397 TOP   Transverse direction   - Only minimum steel required
397 BOTT  Transverse direction     Only minimum steel required
397 TOP       0.288          5 41 /    5       0 288          0.00 /     6
    BOTT      0.288          0 00      5       0 288          4.75 ,     5

    FY    413.682 MPA FC      27 579 MPA COVER     19 050 MM TH    160.000 MM
451 TOP   Longitudinal direction   Only minimum steel required
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451 BOTT  Longitudinal direction   Only minimum steel required.
4 1 TOP   Transverse direction     Only minimum steel required
451 BOTT  Transverse direction     Only minimum steel required
451 TOP        0 288          4.21 /     6        0 288          0 00       6
    BOTT:      0 288          0.00       5        0.288          1 16 /     5

    FY     413.682 MPA FC:    27 579 MPA COVER:    19.050 MM TH:   160.000 MM
453 TOP : Longitudinal direction   Only minimum steel required
453 BOTT  Longitudinal direction   Only minimum steel required
453 TOP   Transverse direction   - Only minimum steel required.
453 BOTT  Transverse direction     Only minimum steel required
453 TOP        0.288          0 00 /             0 288          1 39 /
    BOTT       0 288          4.69       6        0 288          0.00

    FY     413.682 MPA FC.    27 579 MPA COVER     19.050 MM TH    160 000 MM
468 BOTT: Longitudinal direction   Only minimum steel required
468 TOP : Transverse direction   - Only minimum steel required
468 BOTT: Transverse direction     Only minimum steel required
468 TOP        0.293          14 41      6        0 288          3 38       6
    BOTT       0.288          0 00       6        0 288          0.00       5

    FY     413.682 MPA FC     27.579 MPA COVER     19 050 MM TH.   160.000 MM
536 TOP : Longitudinal direction - Only minimum steel required.
536 BOTT: Longitudinal direction   Only minimum steel required.
536 TOP . Transverse direction   - Only minimum steel required
536 TOP :      0.288          0.00 /     6        0.288          0 00 /     6
    BOTT:      0.288          0 51 /     6        0 328          14 55 /    6

    FY.    413 682 MPA FC     27 579 MPA COVER     19 050 MM TH    160 000 MM
537 TOP : Longitudinal direction - Only minimum steel required
537 BOTT: Longitudinal direction   Only minimum steel required
537 TOP : Transverse direction     Only minimum steel required
537 BOTT  Transverse direction   - Only minimum steel required
537 TOP        0.288          0 39 /             0 288          3 73 /     6
    BOTT       0.288          0 54 /     5        0 288          0.00 /

    FY     413.682 MPA FC     27 579 MPA COVER     19 050 MM TH    160.000 MM
542 TOP   Longitudinal direction - Only minimum steel required
542 BOTT: Longitudinal direction - Only minimum steel required
542 TOP   Transverse direction     Only minimum steel required
542 BOTT  Transverse direction   - Only minimum steel required
542 TOP :      0 288          0 00 /     1        0 288          4 10       5
    BOTT.      0 288          6 09               0 288          0 00 /     6

    FY     413 682 MPA FC:    27 579 MPA COVER     19 050 MM TH    240 000 MM
707 TOP . Longitudinal direction   Only minimum steel required
707 BOTT  Longitudinal direction   Only minimum steel required
707 TOP   Transverse direction   - Only minimum steel required
707 BOTT. Transverse direction     Only minimum steel required.
707 TOP        0.432          0 22 /     5        0.432          0 00
    BOTT       0 432          0 05       1        0 432          1.69 /     6

    FY     413 682 MPA FC     27 579 MPA COVER     19 050 MM TH    240 000 MM
708 TOP   Longitudinal direction   Only minimum steel required
708 BOTT  Longitudinal direction   Only minimum steel required
708 TOP : Transverse direction     Only minimum steel required
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708 BOTT: Transverse direction   - Only minimum steel required.
708 TOP        0.432           0.00 /    5         0.432            0.00 /     5
    BOTT       0.432           1 70      6         0 432            0 82 /     5

    FY      413.682 MPA FC      27.5 9 MPA COVER      19 050 MM TH     240 000 MM
709 TOP     Longitudinal direction   Only minimum steel required.
709 BOTT    Longitudinal direction   Only minimum steel required.
709 TOP     Transverse direction   - Only minimum steel required.
709 BOTT    Transverse direction     Only minimum steel required
709 TOP        0.432           0 01 /    5         0 432            0 00 /     5
    BOTT       0 432           0 65 /    6         0.432            4 55 /     6

    FY      413 682 MPA FC      2  579 MPA COVER      19 050 MM TH     240 000 MM
710 TOP     Longitudinal direction - Only minimum steel required.
710 BOTT:   Longitudinal direction - Only minimum steel required.
710 TOP     Transverse direction   - Only minimum steel required
710 BOTT:   Transverse direction   - Only minimum steel required.
710 TOP        0 432           0.00 /    5         0.432            0.00       5
    BOTT       0.432           3 94 /    6         0.432            0.81 /     5

    FY.     413 682 MPA FC.     27 579 MPA COVER      19.050 MM TH     240 000 MM
711 TOP     Longitudinal direction   Only minimum steel required
711 BOTT    Longitudinal direction - Only minimum steel required
711 TOP     Transverse direction     Only minimum steel required
711 BOTT.   Transverse direction     Only minimum steel required
711 TOP        0 432           0 77      5         0 432            2 22 /     6
    BOTT       0 432           0.00 /    6         0 432            0.00 /     5

    FY      413.682 MPA FC      27.579 MPA COVER:     19 050 MM TH     240.000 MM
712 TOP     Longitudinal direction - Only minimum steel required.
712 BOTT    Longitudinal direction   Only minimum steel required.
712 TOP     Transverse direction     Only minimum steel required.
712 BOTT    Transverse direction   - Only minimum steel required.
712 TOP        0 432           0.08 /    5         0.432            0.01
    BOTT       0 432           1.61 /    6         0 432            0.36       6

    FY      413.682 MPA FC      27 579 MPA COVER      19.050 MM TH     240.000 MM
713 TOP     Longitudinal direction - Only minimum steel required
713 BOTT    Longitudinal direction   Only minimum steel required
713 TOP   - Transverse direction     Only minimum steel required
713 BOTT    Transverse direction     Only minimum steel required
713 TOP :      0.432           0.00 /    5         0 432            0 00 /     3
    BOTT       0.432           1 08 /    5         0.432            5.61 /     6

    FY:     413 682 MPA FC:     27 579 MPA COVER:     19 050 MM TH     240 000 MM
714 TOP     Longitudinal direction   Only minimum steel required
714 BOTT    Longitudinal direction - Only minimum steel required
714 TOP     Transverse direction     Only minimum steel required
714 BOTT:   Transverse direction     Only minimum steel required
714 TOP        0 432           0 01 /    3         0 432            0.00       3
    BOTT       0.432           0 57      6         0 432            4.57 /     6

    FY      413 682 MPA FC      27 579 MPA COVER      19 050 MM TH:    240 000 MM
715 TOP     Longitudinal direction   Only minimum steel required.
715 BOTT    Longitudinal direction - Only minimum steel required.
715 TOP     Transverse direction     Only minimum steel required.
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715 BOTT  Transverse direction   - Only minimum steel required
715 TOP :      0.432          0.14 /     5        0.432           0.08 /     3
    BOTT       0.432          0.[illegible]9 /     1        0.432           [illegible].88 /     [illegible]

    FY    413.682 MPA FC      27.579 MPA COVER      19.050 MM TH     240.000 MM
716 TOP   Longitudinal direction - Only minimum steel required.
716 BOTT. Longitudinal direction   Only minimum steel required.
716 TOP   Transverse direction   - Only minimum steel required
716 BOTT  Transverse direction     Only minimum steel required.
716 TOP        0.432          0.00 /     5        0.432           0.00 /     [illegible]
    BOTT       0.432          2.21 /     6        0.432           0.90 /

    FY    413.682 MPA FC      27.579 MPA COVER      19.050 MM TH:    240.000 MM
717 TOP . Longitudinal direction - Only minimum steel required.
717 BOTT  Longitudinal direction - Only minimum steel required
717 TOP   Transverse direction   - Only minimum steel required
717 BOTT  Transverse direction   - Only minimum steel required.
717 TOP        0.432          0.00 /     3        0.432           0.00 /     3
    BOTT       0.432          0.73       6        0.432           5.01       6

    FY    413.682 MPA FC      27.579 MPA COVER.     19.050 MM TH.    240.000 MM
718 TOP   Longitudinal direction - Only minimum steel required
718 BOTT  Longitudinal direction   Only minimum steel required.
718 TOP   Transverse direction   - Only minimum steel required
718 BOTT  Transverse direction   - Only minimum steel required.
718 TOP        0.432          0.00 ,     [illegible]        0.432           0.00 /     3
    BOTT       0.432          4.96 /     6        0.432           0.88 /     [illegible]

    FY    413.682 MPA FC      27.579 MPA COVER      19.050 MM TH     240.000 MM
719 TOP   Longitudinal direction - Only minimum steel required.
719 BOTT  Longitudinal direction - Only minimum steel required.
719 TOP   Transverse direction     Only minimum steel required
719 BOTT  Transverse direction   - Only minimum steel required
719 TOP .      0.432          0.73 /     5        0.432           2.4[illegible]       6
    BOTT       0.432          0.00 ,     6        0.43[illegible]           0.00 /     5

    FY    413.682 MPA FC      27.579 MPA COVER      19.050 MM TH     240.000 MM
720 TOP   Longitudinal direction - Only minimum steel required.
720 BOTT  Longitudinal direction - Only minimum steel required.
720 TOP   Transverse direction   - Only minimum steel required
720 BOTT  Transverse direction   - Only minimum steel required
720 TOP        0.432          0.00 /     [illegible]        0.432           0.08 ,     [illegible]
    BOTT       0.432          2.50 /     6        0.432           0.18 ,     [illegible]

    FY    413.682 MPA FC:     27.579 MPA COVER      19.050 MM TH     240.000 MM
721 TOP   Longitudinal direction   Only minimum steel required.
721 BOTT  Longitudinal direction - Only minimum steel required.
721 TOP   Transverse direction     Only minimum steel required
721 BOTT  Transverse direction   - Only minimum steel required
721 TOP        0.4[illegible]          0.0[illegible]       5        0.43[illegible]           0.00       [illegible]
    BOTT       0.43[illegible]          [illegible]       5        0.432           5.96 /     6

    FY    413.682 MPA FC      27.579 MPA COVER      19.050 MM TH:    240.000 MM
722 TOP   Longitudinal direction - Only minimum steel required
722 BOTT  Longitudinal direction - Only minimum steel required.
722 TOP   Transverse direction   - Only minimum steel required.
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722 BOTT  Transverse direction      Only minimum steel required
722 TOP        0.432          0.01 /     3        0.432           0.00        3
    BOTT       0.432          0.72 /     6        0.432           5.59 /      6

    FY    413.682 MPA FC     27.579 MPA COVER     19.050 MM TH     240.000 MM
723 TOP : Longitudinal direction    Only minimum steel required.
723 BOTT. Longitudinal direction    Only minimum steel required.
723 TOP : Transverse direction      Only minimum steel required
723 BOTT  Transverse direction      Only minimum steel required
723 TOP        0.432          0.03 /     2        0.432           0.16 /      3
    BOTT       0.432          0.18       6        0.432           2.29 /      6

    FY    413.682 MPA FC:    27.579 MPA COVER     19.050 MM TH     240.000 MM
724 TOP   Longitudinal direction    Only minimum steel required
724 BOTT  Longitudinal direction    Only minimum steel required.
724 TOP   Transverse direction      Only minimum steel required
724 BOTT: Transverse direction      Only minimum steel required.
724 TOP        0.432          0.04 /     3        0.432           0.00 /      3
    BOTT:      0.432          2.76 /     6        0.432           0.86 /      6

    FY    413.682 MPA FC     27.579 MPA COVER     19.050 MM TH     240.000 MM
725 TOP . Longitudinal direction - Only minimum steel required.
725 BOTT: Longitudinal direction - Only minimum steel required
725 TOP   Transverse direction      Only minimum steel required
725 BOTT  Transverse direction      Only minimum steel required
725 TOP        0.432          0.03       3        0.432           0.00 /      3
    BOTT:      0.432          0.77       6        0.432           7.09 /      6

    FY    413.682 MPA FC:    27.579 MPA COVER     19.050 MM TH     240.000 MM
726 TOP   Longitudinal direction    Only minimum steel required
726 BOTT: Longitudinal direction - Only minimum steel required
726 TOP : Transverse direction      Only minimum steel required
726 BOTT: Transverse direction      Only minimum steel required
726 TOP :      0.432          0.01 /     3        0.432           0.00 /      3
    BOTT       0.432          5.83 /     6        0.432           1.01 /      5

    FY    413.682 MPA FC:    27.579 MPA COVER:    19.050 MM TH     240.000 MM
727 TOP   Longitudinal direction    Only minimum steel required
727 BOTT  Longitudinal direction    Only minimum steel required
727 TOP   Transverse direction      Only minimum steel required
727 BOTT  Transverse direction      Only minimum steel required
727 TOP        0.432          0.59       5        0.432           3.30        6
    BOTT       0.432          0.00 /     6        0.432           0.00 /      5

    FY:   413.682 MPA FC     27.579 MPA COVER     19.050 MM TH     240.000 MM
728 TOP . Longitudinal direction    Only minimum steel required
728 BOTT: Longitudinal direction - Only minimum steel required
728 TOP : Transverse direction      Only minimum steel required
728 BOTT. Transverse direction      Only minimum steel required
728 TOP        0.432          0.00 /     5        0.432           0.14 /
    BOTT       0.432          2.98 /     6        0.432           0.31 /      6

    FY    413.682 MPA FC:    27.579 MPA COVER     19.050 MM TH     240.000 MM
729 TOP   Longitudinal direction    Only minimum steel required.
729 BOTT: Longitudinal direction    Only minimum steel required
729 TOP . Transverse direction      Only minimum steel required
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729 BOTT  Transverse direction    - Only minimum steel required
729 TOP :      0.432        0.00 /    5        0.432         0.00 /    5
    BOTT       0.432        1.18      6        0.432         8.91 /    6

    FY:    413.682 MPA FC:     27.579 MPA COVER:    19.050 MM TH:    240.000 MM
730 TOP   Longitudinal direction - Only minimum steel required
730 BOTT  Longitudinal direction - Only minimum steel required
730 TOP   Transverse direction    - Only minimum steel required
730 BOTT  Transverse direction    - Only minimum steel required
730 TOP :      0.432        0.00 /    5        0.432         0.00 /    5
    BOTT       0.432        0.93 /    6        0.432         6.46 /    6

    FY:    413.682 MPA FC:     27.579 MPA COVER:    19.050 MM TH:    160.000 MM
731 TOP   Longitudinal direction - Only minimum steel required
731 BOTT  Longitudinal direction - Only minimum steel required.
731 TOP   Transverse direction    - Only minimum steel required
731 TOP        0.288        0.00 /    5        0.288         0.00      3
    BOTT       0.288        8.24      5        0.332        14.69 /    5

    FY:    413.682 MPA FC:     27.579 MPA COVER:    19.050 MM TH:    160.000 MM
732 TOP   Longitudinal direction - Only minimum steel required.
732 BOTT  Longitudinal direction - Only minimum steel required.
732 TOP   Transverse direction    - Only minimum steel required.
732 BOTT  Transverse direction    - Only minimum steel required.
732 TOP :      0.288        0.00      5        0.288         0.00 /    5
    BOTT       0.288        2.32 /    5        0.288        11.05

    FY:    413.682 MPA FC:     27.579 MPA COVER:    19.050 MM TH:    160.000 MM
733 TOP   Longitudinal direction - Only minimum steel required
733 BOTT. Longitudinal direction - Only minimum steel required
733 TOP : Transverse direction    - Only minimum steel required
733 BOTT  Transverse direction    - Only minimum steel required
733 TOP        0.288        0.00 /    5        0.288         0.00 /    3
    BOTT       0.288        1.45 /    5        0.288         9.83

    FY:    413.682 MPA FC:     27.579 MPA COVER:    19.050 MM TH:    160.000 MM
734 TOP   Longitudinal direction - Only minimum steel required
734 BOTT. Longitudinal direction - Only minimum steel required
734 TOP   Transverse direction    - Only minimum steel required
734 BOTT  Transverse direction    - Only minimum steel required
734 TOP        0.288        0.00 /    5        0.288         0.93      5
    BOTT       0.288        4.[illegible]9 /    5        0.288         0.00 /    5

    FY:    413.682 MPA FC:     27.579 MPA COVER:    19.050 MM TH:    160.000 MM
735 TOP . Longitudinal direction - Only minimum steel required
735 BOTT  Longitudinal direction - Only minimum steel required
735 TOP : Transverse direction    - Only minimum steel required.
735 BOTT  Transverse direction    - Only minimum steel required.
735 TOP        0.288        1.[illegible]3      6        0.288         0.64 /    5
    BOTT       0.288        0.00      5        0.288         0.00      5

    FY:    413.682 MPA FC:     27.579 MPA COVER:    19.050 MM TH:    160.000 MM
736 TOP . Longitudinal direction - Only minimum steel required
736 BOTT  Longitudinal direction - Only minimum steel required.
736 TOP   Transverse direction    - Only minimum steel required.
736 BOTT  Transverse direction    - Only minimum steel required
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736 TOP       0.288          1 64 /     5       0 288          C 83
    BOTT      0.288          C 00       5       0 288          0.00 /

    FY    413.682 MPA FC.     2 . 79 MPA COVER    19.050 MM TH    160.000 MM
737 TOP   Longitudinal direction   Only minimum steel required.
737 BOTT  Longitudinal direction - Only minimum steel required
737 TOP   Transverse direction     Only minimum steel required
737 BOTT  Transverse direction     Only minimum steel required
737 TOP       0 288          1.50 /     6       0.288          6 61 /
    BOTT      0.288          0.18 /     3       0.288          0 00 /

    FY    413 682 MPA FC:    27.579 MPA COVER    19 050 MM TH    160 000 MM
738 TOP   Longitudinal direction   Only minimum steel required
738 BOTT: Longitudinal direction   Only minimum steel required
738 TOP   Transverse direction     Only minimum steel required
738 BOTT  Transverse direction     Only minimum steel required.
738 TOP       0 288          3.81       5       0 288          6.68 /     5
    BOTT      0 288          0.00 /     3       0 288          0.00 /     5

    FY    413 682 MPA FC     27.579 MPA COVER    19.050 MM TH    160 000 MM
739 TOP   Longitudinal direction - Only minimum steel required.
739 BOTT: Longitudinal direction   Only minimum steel required
739 TOP : Transverse direction     Only minimum steel required
739 BOTT  Transverse direction     Only minimum steel required
739 TOP       0.288          3 98       5       0 288          5 58       5
    BOTT      0.288          0 00       3       0.288          0.00 /     5

    FY    413.682 MPA FC     27 579 MPA COVER    19 050 MM TH:   160 000 MM
740 TOP   Longitudinal direction   Only minimum steel required
740 BOTT: Longitudinal direction   Only minimum steel required
740 TOP   Transverse direction     Only minimum steel required
740 BOTT  Transverse direction     Only minimum steel required
740 TOP       0.288          2 68 /     6       0 288          7.93 /     5
    BOTT      0 288          0.01 /     3       0 288          0 00 /     5

    FY    413.682 MPA FC:    27 579 MPA COVER    19.050 MM TH    160 000 MM
741 TOP   Longitudinal direction   Only minimum steel required
741 BOTT  Longitudinal direction   Only minimum steel required.
741 TOP : Transverse direction     Only minimum steel required.
741 BOTT  Transverse direction   - Only minimum steel required.
741 TOP       0 288          4.76       5       0.288          7.98 /     5
    BOTT      0 288          0 00 /     3       0.288          0 00

    FY    413 682 MPA FC:    27 579 MPA COVER    19 050 MM TH    160 000 MM
742 TOP . Longitudinal direction   Only minimum steel required.
742 BOTT  Longitudinal direction   Only minimum steel required.
742 TOP   Transverse direction     Only minimum steel required.
742 BOTT. Transverse direction     Only minimum steel required.
742 TOP       0 288          4.59 /     5       0 288          6 70       5
    BOTT:     0 288          0.00 /     3       0 288          0.00 /     5

    FY    413 682 MPA FC.    27 579 MPA COVER    19 050 MM TH    160.000 MM
743 TOP   Longitudinal direction   Only minimum steel required.
743 BOTT  Longitudinal direction - Only minimum steel required
743 TOP   Transverse direction     Only minimum steel required
743 BOTT  Transverse direction     Only minimum steel required
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74: TOP .    0 288        3.00 /    5       0 288          2 22 /    5
    BOTT     0 288        3 53 /    5       0 288          0.00      5

    FY    413.682 MPA FC    27.579 MPA COVER    19.050 MM TH    160.000 MM
744 TOP . Longitudinal direction  Only minimum steel required.
744 BOTT  Longitudinal direction  Only minimum steel required
744 TOP   Transverse direction  - Only minimum steel required
744 BOTT  Transverse direction    Only minimum steel required
744 TOP .    0 288        1.64 /    6       0.288          1 98 /    5
    BOTT:    0.288        0.00 /    5       0.288          0 00      5

    FY    413 682 MPA FC:   27.579 MPA COVER.   19.050 MM TH    160 000 MM
745 TOP : Longitudinal direction  Only minimum steel required
745 BOTT: Longitudinal direction  Only minimum steel required
745 TOP : Transverse direction  - Only minimum steel required
745 BOTT  Transverse direction  - Only minimum steel required.
745 TOP      0.288        1 10 /    5       0 288          1 76      5
    BOTT     0.288        0 00 /    5       0.288          0.00 /    5

    FY    413 682 MPA FC    27 579 MPA COVER    19 050 MM TH    160 000 MM
746 TOP   Longitudinal direction - Only minimum steel required
746 BOTT  Longitudinal direction  Only minimum steel required.
746 TOP   Transverse direction    Only minimum steel required
746 TOP      0.288        0.00      5       0 288          0 00      5
    BOTT     0 288        8.72 /    5       0 348          15 38     5

    FY    413 682 MPA FC    27.579 MPA COVER    19 050 MM TH    160.000 MM
747 TOP   Longitudinal direction - Only minimum steel required
747 BOTT  Longitudinal direction  Only minimum steel required
747 TOP . Transverse direction    Only minimum steel required
747 BOTT. Transverse direction    Only minimum steel required
747 TOP .    0.288        0.00 /    5       0 288          0 00 /    5
    BOTT     0.288        2 47 /    5       0 288          11 86 /

    FY    413.682 MPA FC    27 579 MPA COVER    19 050 MM TH    160.000 MM
748 TOP   Longitudinal direction  Only minimum steel required
748 BOTT  Longitudinal direction - Only minimum steel required
748 TOP   Transverse direction    Only minimum steel required
748 BOTT  Transverse direction    Only minimum steel required
748 TOP .    0 288        0 00      5       0.288          0 00 /
    BOTT     0.288        1 27 /    5       0 288          10 50 /   5

    FY.   413 682 MPA FC:   27.579 MPA COVER    19 050 MM TH:   160.000 MM
749 TOP   Longitudinal direction  Only minimum steel required.
749 BOTT  Longitudinal direction  Only minimum steel required
749 TOP   Transverse direction  - Only minimum steel required.
749 BOTT  Transverse direction    Only minimum steel required
749 TOP      0 288        5.23 /    5       0 288          5 42      5
    BOTT     0.288        0.00      5       0 288          0 00 /    5

    FY.   413.682 MPA FC    27.579 MPA COVER    19 050 MM TH    160 000 MM
750 TOP   Longitudinal direction  Only minimum steel required
750 BOTT  Longitudinal direction  Only minimum steel required
750 TOP . Transverse direction    Only minimum steel required
750 BOTT  Transverse direction  - Only minimum steel required
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750 TOP       0.288          0.29       5        0 288          4 09       5
    BOTT      0 288          0 00       5        0 288          0 0. /     5

    FY    413.682 MPA FC.    27.5 9 MPA COVER      19 050 MM TH     160 000 MM
751 TOP . Longitudinal direction - Only minimum steel required
751 BOTT: Longitudinal direction   Only minimum steel required
751 TOP   Transverse direction     Only minimum steel required
751 BOTT  Transverse direction   - Only minimum steel required.
751 TOP       0.288          0 0  /     5        0 288          1     /     5
    BOTT      0 288          10 37      5        0 288          0 00        .

    FY    413.682 MPA FC     27.579 MPA COVER      19.050 MM TH     160 000 MM
752 TOP   Longitudinal direction - Only minimum steel required
752 BOTT  Longitudinal direction   Only minimum steel required
752 TOP   Transverse direction   - Only minimum steel required
752 BOTT  Transverse direction   - Only minimum steel required
752 TOP       0 288          6 .0 /     5        0 288          6.52       5
    BOTT      0 288          0.00       5        0 288          0 00       5

    FY    413.682 MPA FC     27 579 MPA COVER      19 .50 MM TH     160 000 MM
753 TOP   Longitudinal direction   Only minimum steel required.
753 BOTT  Longitudinal direction   Only minimum steel required
753 TOP   Transverse direction     Only minimum steel required
753 BOTT  Transverse direction     Only minimum steel required
753 TOP       0 288          0 40       5        0 288          5 20 /     5
    BOTT      0.288          0 00       5        0 288          0 00       5

    FY    413.682 MPA FC     27.579 MPA COVER      19 0.0 MM TH     160.000 MM
754 TOP   Longitudinal direction   Only minimum steel required.
754 BOTT  Longitudinal direction - Only minimum steel required.
754 TOP   Transverse direction     Only minimum steel required
754 BOTT  Transverse direction     Only minimum steel required
754 TOP       0 288          0.00 /     5        0 288          2 79       6
    BOTT      0 288          0 93 /     5        0 288          0 00 /     5

    FY    413 682 MPA FC     27.579 MPA COVER      19 050 MM TH     160 000 MM
755 TOP   Longitudinal direction   Only minimum steel required.
755 BOTT  Longitudinal direction   Only minimum steel required
755 TOP   Transverse direction     Only minimum steel required
755 BOTT  Transverse direction     Only minimum steel required
755 TOP       0 288          5.66 /     5        0.288          4 .2 /     6
    BOTT      0.288          0 00       5        0.288          0 00 /     5

    FY    413 682 MPA FC     27 579 MPA COVER      19.050 MM TH     16  000 MM
756 TOP : Longitudinal direction   Only minimum steel required
756 BOTT  Longitudinal direction   Only minimum steel required
756 TOP   Transverse direction     Only minimum steel required
756 BOTT  Transverse direction     Only minimum steel required
756 TOP       0 288          0  4 /     1        0 288          3.22       6
    BOTT      0 288          0.16       2        0 288          0 00 /     5

    FY    413 682 MPA FC.    27 579 MPA COVER.     19 050 MM TH     160 000 MM
757 TOP   Longitudinal direction   Only minimum steel required
757 BOTT  Longitudinal direction   Only minimum steel required
757 TOP   Transverse direction     Only minimum steel required
757 BOTT  Transverse direction     Only minimum steel required
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757 TOP      0.288       0 00 ,    1      0.288        1.1. /    6
    BOTT:    0.288      11 11 /    5      0.288        0 01      3

    FY   413 682 MPA FC     27 579 MPA COVER    19 050 MM TH    160 000 MM
758 TOP : Longitudinal direction   Only minimum steel required
758 BOTT  Longitudinal direction   Only minimum steel required
758 TOP   Transverse direction   - Only minimum steel required
758 BOTT: Transverse direction     Only minimum steel required
758 TOP :    0.288       1 14 /    6      0.288        0 00 /    6
    BOTT:    0.288       0 01 /    3      0.288       11 95 /    5

    FY   413.682 MPA FC:    27 579 MPA COVER    19 050 MM TH    160.000 MM
759 TOP   Longitudinal direction - Only minimum steel required.
759 BOTT  Longitudinal direction   Only minimum steel required.
759 TOP   Transverse direction     Only minimum steel required.
759 BOTT: Transverse direction     Only minimum steel required
759 TOP :    0 288       2 79      6      0 288        0.00 /    6
    BOTT     0 288       0 00 /    3      0 288        11.67     5

    FY   413.682 MPA FC     27 579 MPA COVER    19 050 MM TH    160.000 MM
760 TOP   Longitudinal direction - Only minimum steel required.
760 BOTT. Longitudinal direction   Only minimum steel required
760 TOP : Transverse direction   - Only minimum steel required
760 BOTT  Transverse direction   - Only minimum steel required
760 TOP .    0.288       1 74 ,    6      0.288        0 00 /    6
    BOTT:    0.288       0 00      3      0 288       11 00 /

    FY   413 682 MPA FC     27.579 MPA COVER    19 050 MM TH    160 000 MM
761 TOP . Longitudinal direction - Only minimum steel required
761 BOTT  Longitudinal direction - Only minimum steel required
761 TOP   Transverse direction   - Only minimum steel required.
761 BOTT  Transverse direction     Only minimum steel required
761 TOP      0 288       3.43 ,    6      0 288        0 22 /    
    BOTT     0 288       0 00      3      0.288        0 33 /    

    FY   413 682 MPA FC.    27 579 MPA COVER    19 050 MM TH    160 000 MM
762 TOP   Longitudinal direction   Only minimum steel required
762 BOTT. Longitudinal direction   Only minimum steel required
762 TOP   Transverse direction     Only minimum steel required.
762 BOTT  Transverse direction   - Only minimum steel required.
762 TOP      0 288       5 42 /    5      0 288        0 1? ,    5
    BOTT     0 288       0.00 ,    3      0.288        0 03 ,    2

    FY   413 682 MPA FC     27 579 MPA COVER    19.050 MM TH    160 000 MM
763 TOP : Longitudinal direction - Only minimum steel required
763 BOTT  Longitudinal direction   Only minimum steel required
763 TOP   Transverse direction   - Only minimum steel required.
763 BOTT  Transverse direction     Only minimum steel required.
763 TOP      0 288       4.22      5      0 288        0.13      5
    BOTT     0 288       0.00      3      0.288        0.03 /    

    FY   413 682 MPA FC     27 579 MPA COVER    19.050 MM TH    160 000 MM
764 TOP : Longitudinal direction   Only minimum steel required
764 BOTT  Longitudinal direction - Only minimum steel required
764 TOP   Transverse direction     Only minimum steel required.
764 BOTT  Transverse direction     Only minimum steel required.
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 64 TOP      0.288       4.71 /    6     0.288       5.94 /    6
    BOTT     0.288       0.00      3     0.288       0.00 /    1

    FY    413.682 MPA FC:   27.579 MPA COVER    19.050 MM TH    160.000 MM
765 TOP - Longitudinal direction   Only minimum steel required
765 BOTT  Longitudinal direction   Only minimum steel required
765 TOP   Transverse direction   - Only minimum steel required
765 BOTT  Transverse direction     Only minimum steel required
765 TOP      0.288       7.02      5     0.288       6.14 /    5
    BOTT     0.288       0.00      5     0.288       0.00 /

    FY    413.682 MPA FC    27.579 MPA COVER    19.050 MM TH    160.000 MM
766 TOP   Longitudinal direction - Only minimum steel required
766 BOTT. Longitudinal direction   Only minimum steel required
766 TOP   Transverse direction   - Only minimum steel required
766 BOTT  Transverse direction     Only minimum steel required
766 TOP      0.288       5.74 /    5     0.288       5.48 /    5
    BOTT     0.288       0.00 /    5     0.288       0.00 /

    FY    413.682 MPA FC:   27.579 MPA COVER    19.050 MM TH    160.000 MM
767 TOP   Longitudinal direction   Only minimum steel required
767 BOTT  Longitudinal direction - Only minimum steel required
767 TOP   Transverse direction     Only minimum steel required
767 BOTT  Transverse direction     Only minimum steel required
767 TOP      0.288       0.00 /    5     0.288       0.00 /    5
    BOTT     0.288       1.38 /    5     0.288       2.90 /

    FY    413.682 MPA FC    27.579 MPA COVER    19.050 MM TH    160.000 MM
768 TOP   Longitudinal direction   Only minimum steel required
768 BOTT  Longitudinal direction   Only minimum steel required.
768 TOP   Transverse direction     Only minimum steel required
768 BOTT  Transverse direction     Only minimum steel required
768 TOP      0.288       0.00 /    5     0.288       0.00 /    5
    BOTT     0.288       2.63      5     0.288       3.78 /    5

    FY    413.682 MPA FC:   27.579 MPA COVER    19.050 MM TH    160.000 MM
769 TOP - Longitudinal direction   Only minimum steel required
769 BOTT  Longitudinal direction   Only minimum steel required
769 TOP   Transverse direction     Only minimum steel required
769 BOTT  Transverse direction     Only minimum steel required
769 TOP      0.288       0.00      5     0.288       0.00 /    5
    BOTT     0.288       7.56      5     0.288       4.65 /    5

    FY    413.682 MPA FC    27.579 MPA COVER    19.050 MM TH    160.000 MM
770 TOP   Longitudinal direction   Only minimum steel required.
770 BOTT  Longitudinal direction   Only minimum steel required.
770 TOP   Transverse direction   - Only minimum steel required
770 BOTT. Transverse direction     Only minimum steel required
770 TOP      0.288       0.00      5     0.288       1.08 /    6
    BOTT.    0.288       2.70      5     0.288       2.45 /    5

    FY    413.682 MPA FC    27.579 MPA COVER    19.050 MM TH    160.000 MM
771 TOP   Longitudinal direction - Only minimum steel required.
771 BOTT  Longitudinal direction   Only minimum steel required.
771 TOP . Transverse direction     Only minimum steel required
771 BOTT  Transverse direction   - Only minimum steel required
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771 TOP        0.288          0.00 /     5        0.288          0.00 /     6
    BOTT       0.288          1.63       5        0.288          0.51 ,     5

    FY     413.682 MPA FC     27.579 MPA COVER:    19.050 MM TH    160.000 MM
  2 TOP    Longitudinal direction - Only minimum steel required
772 BOTT   Longitudinal direction   Only minimum steel required
772 TOP    Transverse direction     Only minimum steel required
772 BOTT   Transverse direction   - Only minimum steel required.
772 TOP        0.288          0.00 /     5        0.288          0.00       6
    BOTT:      0.288          7.24       5        0.288          1.17 /
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    FY.    413.682 MPA FC     27.579 MPA COVER:    19.050 MM TH    160.000 MM
773 TOP .  Longitudinal direction - Only minimum steel required
773 BOTT:  Longitudinal direction   Only minimum steel required.
773 TOP    Transverse direction     Only minimum steel required.
773 BOTT   Transverse direction     Only minimum steel required
773 TOP        0.288          0.00 ,     5        0.288          0.00 /     6
    BOTT       0.288          5.02 /     5        0.288          4.82       5

    FY     413.682 MPA FC     27.579 MPA COVER     19.050 MM TH    160.000 MM
774 TOP .  Longitudinal direction - Only minimum steel required
774 BOTT   Longitudinal direction - Only minimum steel required
774 TOP    Transverse direction   - Only minimum steel required
774 BOTT:  Transverse direction   - Only minimum steel required
774 TOP        0.288          0.00 /     5        0.288          0.00 ,     6
    BOTT.      0.288          7.33       6        0.288          0.30       5

    FY     413.682 MPA FC     27.579 MPA COVER     19.050 MM TH    160.000 MM
775 TOP    Longitudinal direction   Only minimum steel required
775 BOTT   Longitudinal direction - Only minimum steel required
775 TOP    Transverse direction     Only minimum steel required.
775 BOTT   Transverse direction     Only minimum steel required
775 TOP        0.288          0.00 /     5        0.288          0.71 /     6
    BOTT       0.288          6.22       5        0.288          0.06       3

    FY     413.682 MPA FC:    27.579 MPA COVER     19.050 MM TH    160.000 MM
776 TOP :  Longitudinal direction   Only minimum steel required
776 BOTT:  Longitudinal direction - Only minimum steel required
776 TOP    Transverse direction     Only minimum steel required
776 BOTT:  Transverse direction   - Only minimum steel required
776 TOP :      0.288          0.00 /     5        0.288          0.00       6
    BOTT       0.288          7.42 /     5        0.288          4.55 ,     5

    FY     413.682 MPA FC     27.579 MPA COVER     19.050 MM TH    160.000 MM
777 TOP    Longitudinal direction   Only minimum steel required.
777 BOTT   Longitudinal direction   Only minimum steel required
777 TOP    Transverse direction     Only minimum steel required
777 BOTT   Transverse direction   - Only minimum steel required
777 TOP        0.288          0.00 ,     5        0.288          0.00       6
    BOTT:      0.288          2.61       5        0.288          3.58 /     5

    FY     413.682 MPA FC     27.579 MPA COVER     19.050 MM TH    160.000 MM
778 TOP    Longitudinal direction   Only minimum steel required
778 BOTT   Longitudinal direction   Only minimum steel required
778 TOP    Transverse direction     Only minimum steel required.
778 BOTT.  Transverse direction   - Only minimum steel required
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778 TOP       0.288          0 00 /     5        0.288          0.00 /     6
    BOTT      0.288          1 49       5        0.288          2 72 /     5

    FY     413.682 MPA FC      27 579 MPA COVER      19 050 MM TH     160.000 MM
779 TOP   Longitudinal direction   Only minimum steel required
779 BOTT  Longit.dinal direct.on   Only minimum stee. required.
779 TOP   Transverse direction     Only minimum steel required
779 BOTT: Transverse direction   - Only minimum steel required
779 TOP :     0 288          0.00 /     5        0 288          0.00       6
    BOTT      0 288          1.16 ,     5        0 288          1 16       5

    FY     413 682 MPA FC:     27 579 MPA COVER      19.050 MM TH     160 000 MM
780 TOP   Longitudinal direction   Only minimum steel required
780 BOTT  Longitudinal direction - Only minimum steel required
780 TOP   Transverse direction     Only minimum steel required.
780 BOTT  Transverse direction   - Only minimum steel required.
780 TOP       0 288          0 00       5        0 288          0 00 /     6
    BOTT.     0.288          1 70 /              0.288          0 45 /     [illegible]

    FY     413 682 MPA FC      27 579 MPA COVER      19 050 MM TH     160.000 MM
781 TOP : Longitudinal direction   Only minimum steel required.
781 BOTT. Longitudinal direction - Only minimum steel required
781 TOP   Transverse direction     Only minimum stee. required
781 BOTT: Transverse direction     Only minimum steel required
781 TOP .     0.288          0 0  /     5        0.288          0 15 /     6
    BOTT      0 288          2 48 ,     5        0 288          0 37 ,     5

    FY     413.682 MPA FC      27.579 MPA COVER      19.050 MM TH     160.000 MM
782 TOP . Longitudinal direction   Only minimum steel required
782 BOTT: Longit.dinal direct.on   Only minimum steel required
782 TOP   Transverse direction   - Only minimum steel required
782 BOTT: Transverse direct.on     Only minimum stee. required
782 TOP :     0.288          0 00 /     5        0 288          0 69 /     6
    BOTT      0.288          6 14 /     5        0 288          0 06 /     5

    FY     413.682 MPA FC      27.579 MPA COVER      19 050 MM TH     160 000 MM
783 TOP   Longitudinal direction   Only minimum steel required
783 BOTT  Longitudinal dire t on   Only minimum steel required
783 TOP   Transverse direction   - Only minimum steel required
783 BOTT  Transverse direction     Only minimum steel required
783 TOP       0.288          0 00 /     5        0 288          0.00 /     6
    BOTT      0 288          1 47                0 288          0 37 ,     5

    FY     413.682 MPA FC      27 579 MPA COVER      19.050 MM TH     160 000 MM
784 TOP : Longitudinal direction   Only minimum stee. required
784 BOTT  Longitudinal direction   Only minimum stee. required
784 TOP : Transverse direction   - Only minimum steel required
784 BOTT  Transverse direction     Only minimum steel required
784 TOP       0.288          0 00 ,     5        0 288          0.00 /     6
    BOTT      0 288          5.6[illegible]       5        0 288          5.91 /     5

    FY     413 682 MPA FC.     27 579 MPA COVER:     19.050 MM TH     160 000 MM
785 TOP   Longitudinal direction   Only minimum stee. required
785 BOTT  Longitudinal direction - Only minimum steel required.
785 TOP   Transverse direction     Only minimum steel required.
785 BOTT: Transverse direction     Only minimum steel required
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785 TOP :     0.288          0.00 /     5        0.288          0.00 /     6
    BOTT:     0.288          2.46 /     5        0.288          3.94 /     5

    FY:   413.682 MPA FC:    27.579 MPA COVER:    19.050 MM TH:   160.000 MM
786 TOP : Longitudinal direction - Only minimum steel required.
786 BOTT: Longitudinal direction - Only minimum steel required.
786 TOP : Transverse direction   - Only minimum steel required.
786 BOTT: Transverse direction   - Only minimum steel required.
786 TOP :     0.288          0.00 /     5        0.288          0.00 /     6
    BOTT:     0.288          0.39 /     5        0.288          4.92 /     5

    FY:   413.682 MPA FC:    27.579 MPA COVER:    19.050 MM TH:   160.000 MM
787 TOP : Longitudinal direction - Only minimum steel required.
787 BOTT: Longitudinal direction - Only minimum steel required.
787 TOP : Transverse direction   - Only minimum steel required.
787 BOTT: Transverse direction   - Only minimum steel required.
787 TOP :     0.288          0.80 /     6        0.288          0.00 /     6
    BOTT:     0.288          0.02 /     3        0.288          5.41 /     5

    FY:   413.682 MPA FC:    27.579 MPA COVER:    19.050 MM TH:   160.000 MM
788 TOP : Longitudinal direction - Only minimum steel required.
788 BOTT: Longitudinal direction - Only minimum steel required.
788 TOP : Transverse direction   - Only minimum steel required.
788 BOTT: Transverse direction   - Only minimum steel required.
788 TOP :     0.288          0.00 /     6        0.288          0.00 /     6
    BOTT:     0.288          1.93 /     5        0.288          1.93 /     5

    FY:   413.682 MPA FC:    27.579 MPA COVER:    19.050 MM TH:   160.000 MM
789 TOP : Longitudinal direction - Only minimum steel required.
789 BOTT: Longitudinal direction - Only minimum steel required.
789 TOP : Transverse direction   - Only minimum steel required.
789 BOTT: Transverse direction   - Only minimum steel required.
789 TOP :     0.288          0.00 /     6        0.288          0.00 /     6
    BOTT:     0.288          0.60 /     6        0.288          1.49 /     5

    FY:   413.682 MPA FC:    27.579 MPA COVER:    19.050 MM TH:   160.000 MM
790 TOP : Longitudinal direction - Only minimum steel required.
790 BOTT: Longitudinal direction - Only minimum steel required.
790 TOP : Transverse direction   - Only minimum steel required.
790 BOTT: Transverse direction   - Only minimum steel required.
790 TOP :     0.288          0.00 /     6        0.288          0.00 /     6
    BOTT:     0.288          0.71 /     6        0.288          1.53 /     6

    FY:   413.682 MPA FC:    27.579 MPA COVER:    19.050 MM TH:   160.000 MM
791 TOP : Longitudinal direction - Only minimum steel required.
791 BOTT: Longitudinal direction - Only minimum steel required.
791 TOP : Transverse direction   - Only minimum steel required.
791 BOTT: Transverse direction   - Only minimum steel required.
791 TOP :     0.288          0.00 /     6        0.288          0.00 /     6
    BOTT:     0.288          2.07 /     5        0.288          4.49 /     5

    FY:   413.682 MPA FC:    27.579 MPA COVER:    19.050 MM TH:   160.000 MM
792 TOP : Longitudinal direction - Only minimum steel required.
792 BOTT: Longitudinal direction - Only minimum steel required.
792 TOP : Transverse direction   - Only minimum steel required.
792 BOTT: Transverse direction   - Only minimum steel required.
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الفصل الخامس

الخلاصة :-

ان التصميم الانشائي للمباني هومن صميم عمل المهندس المدني والذي يعكس فيه كل امكانياته وخبراته في التصميم الانشائي للوصول الى الشكل الامثل من خلال استخدام المواد مع توفير الدقة والجمالية بموجب المواصفات المطلوبة مع التوازن الامثل بين الوقت والكلفة والامان .

تم اعتماد برنامج STAAD pro.v8i في تنفيذ المشروع لانشاء بناية ٤ طوابق لقسم دراسي لاحد الجامعات وكانت النتائج جيدة ومطابقة للمواصفات القياسية مما يدل على دقة البرامج واهميتها في مجال الهندسة المدنية.

ان الاعتماد فقط على البرامج الجاهزة في التصميم الانشائي بالرغم من الدقة والسرعة العاليتين في التنفيذ التي تمتلكها تلك البرامج تكون غير كافية وجازمة من دون ان يكون لدى المهندس الخبرة الكافية و الحس الهندسي اللازم للتاكد من صحة تلك النتائج وملائمتها للواقع لان التحليل والتصميم باستخدام البرامج قد يصاحبة بعض الاخطاء نيجة لسهو في الادخال او سوء تقدير للنتائج وقد صادفتني مثل تلك المشكلة اثناء ادخال الاحمال حيث قمت بادخال الحمل مرتين لاحد الطوابق سهوا ونتيجة لذلك كانت كمية حديد التسليح كبيرة ولولا نصيحة الدكتور المشرف لما استطعت معرفة الخطا الحاصل في التصميم وهذا يدل على ان من اهم عناصر التصميم السريع والدقيق هما الخبرة العملية والدقة في استخدام البرامج اي ان احدهما يكمل الاخر ، نحن في هذة المرحلة اخذنا فكرة عن استخدام البرامج في التحليل و التصميم و لكن الخبرة لايمكن اكتسابها الا بالعمل الميداني ومواكبة التطور العلمي في هذا المجال .

